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TO: HOLDERS OF 860E-2 DISTANCE MEASURING EQUIPMENT OVERHAUL MANUAL
(523-0755913)

REVISION NO. 6 HIGHLIGHTS

Replace outdated pages with the enclosed revised pages. This revision includes a description of the Echo Protector Circuit and updates power supply options. Included is a revised list of options currently available.

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overhaul manual

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Equipment

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860E-2 Distance Measuring Equipment

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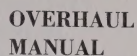


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ON RECEIPT OF REVISIONS, INSERT REVISED PAGES IN THE MANUAL, AND ENTER DATE INSERTED AND INITIALS.



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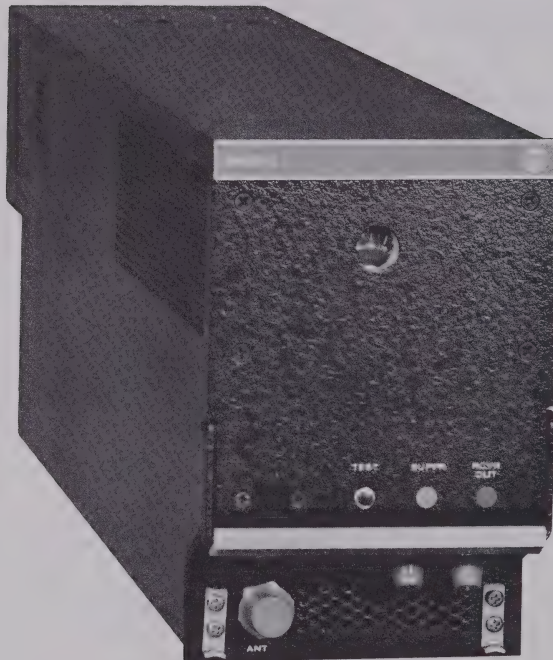
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860E-2 Distance Measuring Equipment
Figure 1



860E-2 Distance Measuring Equipment - Description and Operation

1. GENERAL.

A. Purpose of Manual.

This manual contains the information necessary to overhaul Collins 860E-2 Distance Measuring Equipment. Included is a description of the equipment, a theory of operation, disassembly, cleaning, inspection, repair and assembly information, and complete testing and troubleshooting information. The 860E-2 is shown in figure 1. A list of the associated equipment is given in figure 2.

COMPONENT	WEIGHT (lb)	COLLINS PART NUMBER
237Z-1 Antenna	0.19	522-2632-00
349D-3B Shockmount	2.25	522-2144-004
614U-7 Control Unit	1.9	522-1473-00
614U-8 Control Unit	1.9	522-1474-00
313N-2D Control Unit	2.25	522-2447-025 or 522-2448-035
313N-3D Control Unit	2.25	522-2448-025 or 522-2448-055
313N-4D Control Unit	1.2	522-3616-00
339D-1 Distance Indicator	1.1	522-1859-003
339D-3B Distance Indicator	2.0	522-2919-00
339D-3C Distance Indicator	2.0	522-2920-00
339D-3D Distance Indicator	2.0	522-3343-00

Table of Associated Equipment
Figure 2



B. Purpose of Equipment.

The 860E-2 Distance Measuring Equipment electronically measures the line-of-sight distance from an airplane to a fixed TACAN or VORTAC station. The transmitter portion of the 860E-2 transmits shaped and coded interrogation pulses. These pulses are received by the ground station which then transmits reply pulses. The reply pulses are received by the receiver portion of the 860E-2. The computing circuits in the 860E-2 measure the round trip travel time, or the interval between interrogation and reply pulses, and converts this time to electrical signals to drive a distance indicator.

C. Other Publications Available.

Figure 3 lists the other publications concerning the 860E-2 and associated equipment.

PUBLICATION	COLLINS PART NUMBER
860E-2 Distance Measuring Equipment	
Electromechanical Components Overhaul Manual	523-0757895
Maintenance Manual	523-0755912
Pilot's Guide	523-0755915
Question and Answer Manual	523-0755916
Control Units	
313N-2 Instruction Book	523-0754001
313N-3 Instruction Book	523-0752001
614U-7/8 Instruction Book	520-5963001
Indicators	
339D-1/3B/3C/3D Unit Instructions, Maintenance	523-0755287
339D-1/3B/3C/3D Unit Instructions, Overhaul	523-0755288
Antenna	
237Z-1 Unit Instructions, Overhaul	523-0756146

Table of Related Publications
Figure 3



D. Options and Variations.

The 860E-2 is available in the 29 different models listed in figure 4A. The kits listed in figure 4 are available for modifying the 860E-2. Internal wiring changes described in paragraph 4.L of the testing section of this manual, will provide the following alternate performance features:

- (1) Static memory instead of velocity memory.
- (2) Fast flag instead of slow flag.
- (3) ILS and TVOR channels always overridden, or ILS and TVOR channels overridable, or ILS channels overridable and TVOR channels always overridden instead of ILS channels not overridable and TVOR channels overridable. Split channel capability is obtained by the addition of a single wire.

KIT DESCRIPTION	COLLINS PART NUMBER
Elapsed time meter	554-6308-00
Power relay	974-0839-00
12.5-mile trip switch	554-7220-00
Computer potentiometers	381-1497-00

Table of Optional Kits Available
Figure 4



OVERHAUL MANUAL

COLLINS PART NUMBER	FEATURES														
	SELF-TEST	VELOCITY MEMORY	STATIC MEMORY	FAST FLAG	SLOW FLAG	SPLIT CHANNEL ACTIVATED	ILS CHANNEL *	TVOR CHANNEL *	POWER RELAY	DUAL COMPUTER POTENTIOMETERS	12.5-MILE TRIP SWITCH	ELAPSED-TIME INDICATOR	200-MILE MAXIMUM RANGE	300-MILE MAXIMUM RANGE	200/300-MILE OVERRIDE CAPABILITY
522-2702-00		X			X		XXX	X					X		
522-2702-011		X			X		XXX	X				X	X		
522-2702-013		X			X		XXX	X	X				X		
522-2702-014	X	X			X		XXX	X					X		
522-2702-016		X		X			XXX	X			X		X		
522-2702-018		X			X		XXX	X		X			X		
522-2702-020		X		X			XXX	X		X	X		X		
522-2702-021		X			X		XXX	X							
522-2702-030		X			X	X	XXX	X					X		
522-2702-031			X		X		XXX	X					X		
522-2702-032		X		X			XXX	X					X		
522-2702-033			X	X			XXX	X					X		
522-2702-035		X			X		X	XX					X		
522-2702-036		X			X		XX	XX					X		
522-2702-052	X	X			X	X	X	XX	X				X		
522-2702-053	X	X			X	X	X	X					X		
522-2702-054	X	X			X		XXX	X	X				X		
522-2702-055	X	X			X	X	X	XX	X	X				X	X
522-2702-056	X	X			X		XXX	X				X	X		
522-2702-058	X	X			X		XXX	X		X				X	X
522-2702-060	X	X			X		XXX	X		X	X			X	X
522-2702-061	X	X			X		XXX	X	X					X	X
522-2702-062	X	X			X		XXX	X						X	X
522-2702-063	X	X			X		XXX	X	X	X				X	X
522-2702-064	X	X			X		X	X		X	X			X	X
522-2702-065	X	X			X		XXX	X	X	X	X			X	X
522-2702-066	X	X			X		X	X		X				X	X
522-2702-068	X	X			X		XXX	X			X		X		
522-2702-070	X	X			X		X	XX	X	X		X		X	X
NOTE: ILS Channel Override Status															
(X) Overridable															
(XX) Permanently overridden															
(XXX) Not overridable															
TVOR Channel Override Status															
(X) Overridable															
(XX) Permanently overridden															
(XXX) Not overridable															

Table of Available Models and Features
Figure 4A



COLLINS PART NUMBER	OPTIONS											
	MEMORY		FLAG		ILS CHANNELS			TVOR CHANNELS				200/300-MILE OVERRIDE CAPABILITY
	STATIC	VELOCITY	SLOW	FAST	PERMANENTLY OVERRIDDEN	OVERRIDABLE	NOT OVERRIDABLE	OVERRIDABLE	NOT OVERRIDABLE	PERMANENTLY OVERRIDDEN		
554-1626-00		X	X				X	X				
554-1626-011		X	X				X	X			X	
554-1626-012	X		X				X	X				
554-1626-013		X		X			X	X				
554-1626-014	X			X			X	X				
554-1626-015		X	X			X		X			X	X
554-1626-016		X	X			X				X		
554-1626-018		X	X		X					X		
554-1626-020		X	X				X	X			X	X
554-1626-021		X	X			X				X	X	
554-1626-022		X	X			X		X			X	
554-1626-023		X	X			X				X	X	X

860E-2 DME Board A7 Options
Figure 4B



OPTIONS

COLLINS PART NUMBER	INCLUDES ELAPSED TIME METER	INCLUDES POWER RELAY	INCLUDES SPLIT CHANNEL WIRE
554-1621-00			
554-1621-011	X		
554-1621-013		X	
554-1621-014			X
554-1621-015	X	X	
554-1621-018		X	X

860E-2 DME Chassis, Power Supply Options
Figure 4C



CHARACTERISTIC	SPECIFICATION
Transmit/receive (search)	
27.5 volts d-c	0.350 amp, 9.625 watts, maximum.
115 volts, 380 to 420 cps	0.6 amp, 42 watts, maximum (includes 16 watts blower power).
115 volts, 300 to 1000 cps	0.95 amp, 95 watts, maximum.
Transmit/receive (track)	
27.5 volts d-c	0.310 amp, 8.525 watts, maximum plus flag current which does not exceed 0.5 amp, 13.75 watts.
115 volts, 380 to 420 cps	0.6 amp, 42 watts, maximum (includes 16 watts blower power).
115 volts, 300 to 1000 cps	0.860 amp, 89 watts, maximum.
Channeling	Same as receive only except 1.3 amp at 27.5 volts d-c is required.
R-f power output	The r-f peak power output is 1000 watts ± 3 db into a 50-ohm load with the difference between the first and second transmitted pulse no greater than 1 db.
Load impedance	The impedance presented to the 860E-2 by the antenna and transmission line is a nominal 50 ohms, and the vswr does not exceed 1.5:1 over the frequency range of 962 to 1213 mc.
Frequency range	
Transmit	1025 to 1150 mc with 1-mc channels.
Receive	
X channels	962 to 1024 mc and 1151 to 1213 mc with 1-mc channels.
Y channels	1025 to 1150 with 1-mc channels.
Number of channels	252.

Table of Equipment Specifications (Sheet 2 of 9)
Figure 5



CHARACTERISTIC	SPECIFICATION
Channeling time	10 seconds maximum.
Frequency stability	The transmitter, first injection and second injection signals are accurate to $\pm 0.005\%$.
Interrogation pulse pair repetition rate	146 ± 4 pulse pairs per second on search. 21 ± 2 pulse pairs per second on track.
Interrogator pulse coding	Pulse spacing is 12 ± 0.5 usec for normal operation (X channels) and 36 ± 0.5 usec for split channel operation (Y channels).
Interrogation pulse characteristics	
Pulse rise time (10 to 90 percent voltage points)	Not more than 3 usec.
Pulse decay time (90 to 10 percent voltage points)	Not more than 3 usec.
Pulse duration (at the 50 percent voltage points)	3.5 ± 0.5 usec.
Interrogation pulse spectrum	At least 90% of the transmitted energy is within 250 kHz of the selected channel frequency.
Search speed	More than 12 nautical miles per second.
Maximum range	0 to 192 nautical miles with provisions to increase range to 288 nautical miles.
Suppression input pulse characteristics	
Amplitude	18 to 70 volts.
Polarity	Positive.
Rise time	20 volts/usec or greater.
Decay time	10 volts/usec or greater.
Input impedance	2000 ohms or greater.

Table of Equipment Specifications (Sheet 3 of 9)
Figure 5



CHARACTERISTIC	SPECIFICATION
Suppression output pulse characteristics	
Amplitude	20 to 35 volts.
Polarity	Positive.
Pulse rise time	20 volts/usec or greater.
Decay time	10 volts/usec or greater.
Pulse duration	48 to 53 usec.
Synchronization	18 volts amplitude 0.8 to 5.0 usec before the 10 percent level of the first transmitted pulse.
Distance accuracy	Over the range of +5°C to +45°C: (1) ± 0.2 nautical mile from 0 to 192 nautical miles at 1000 knots with signal levels between -20 dbm and -80 dbm. (2) ± 0.3 nautical mile from 192 to 288 nautical miles at 1000 knots with signal levels between -20 dbm and -80 dbm. (3) ± 0.1 nautical mile from 0 to 5 nautical miles at 200 knots with signal levels between -20 dbm and -60 dbm.
Receiver sensitivity	With 70% reply efficiency and a standard TACAN test signal, the level required for 4 out of 5 lock-ons is not less than -86 dbm. The signal level required to produce minimum readable identification is no greater than the distance lock-on level.
Decoder selectivity	Signals are rejected with pulse spacings less than 8 usec or greater than 16 usec in the case of X channels and less than 26 usec or more than 34 usec in the case of Y channels for levels up to -48 dbm.

Table of Equipment Specifications (Sheet 4 of 9)
Figure 5



CHARACTERISTIC	SPECIFICATION
Cochannel performance	When two or more ground beacon signals on the same channel are received, and if one signal is 8 db or more larger in amplitude than the next stronger signal, the distance displayed is that of the stronger signal, and the aural identification identifies the stronger signal in an unambiguous manner. Further, when the difference in level between two such cochannel signals is such that lock-on to either signal may be obtained, the aural identification gives positive indication of this hazardous condition by garbling or by presenting both identifications. These conditions are met at signal levels up to -48 dbm for the stronger signal.
Lock-on and track characteristics	The 860E-2 DME locks on and tracks a target moving at speeds up to 2000 knots inbound or outbound. The 860E-2 tracks smoothly, and the flag remains out of view during aural identification.
Prememory	The prememory time is no more than two seconds.
Memory	(1) The memory time is no greater than 13 seconds except on ILS channels not overridden where it is no greater than 6 seconds. (2) Velocity or static type memory can be provided with proper internal jumper connections. (3) Memory is canceled following channeling or standby.
Aural identification	(1) The receiver gain is capable of being set such that a -86-dbm signal in accordance with section 3.7 of MIL-STD-291A produces at least 75 milliwatts of identification tone into a resistive load of 200 to 500 ohms. The noise average power output is 30 db below the level of the identification tone when the aural identification pulses are replaced with squitter pulses. An audio gain control is provided within the DME which shall allow adjustment of the output for any value from 0 to 75 milliwatts.

Table of Equipment Specifications (Sheet 5 of 9)
Figure 5



OVERHAUL MANUAL

CHARACTERISTIC	SPECIFICATION
Cooling air	(2) With the conditions of preceding paragraph (1), but with the equalizing pulses removed, the DME produces at least 15 milliwatts of identification tone into a resistive load of 200 to 500 ohms. Cooling air must be provided in one of two ways: (1) By a blower mounted in the 860E-2 or, (2) By ARINC cooling at a recommended flow rate of 45 pounds per hour (absolute minimum flow rate of 29 pounds per hour) with cooling air temperature not to exceed 80°F in accordance with ARINC Specification No. 404.
Receiver selectivity	(1) The level of input signal required to produce a successful end of search four out of five search cycles does not vary more than 6 db for input signal frequencies in the range of ± 200 kc from the assigned channel frequency under standard conditions. (2) When a TACAN signal having a center frequency 800 kc or more removed from the center frequency of the selected channel, and a signal level of -30 dbm is applied to the antenna terminal with no on-channel signal present, there is no aural identification or distance lock-on and the flag is covering under standard conditions.
Range limit	The 860E-2 provides a short range function which will allow the unit to search or track only out to a preset distance when operating on channels 17 X and Y to 56 X and Y inclusive. This distance is adjustable from 10 to 70 nautical miles with an accuracy of ± 2 nautical miles. The 20 even-numbered X channels are designated ILS channels. The remaining 60 channels are designated TVOR channels.
Range limit override	(1) The 860E-2 provides the following range limit override options with proper internal jumper connections and the short range override control on wire P2-19:

Table of Equipment Specifications (Sheet 7 of 10)
Figure 5



OVERHAUL MANUAL

CHARACTERISTIC	SPECIFICATION
	(a) TVOR overridable, ILS not overridable. (b) TVOR overridable, ILS overridable. (c) TVOR permanently overridden, ILS overridable. (d) TVOR permanently overridden, ILS permanently overridden. (2) If 300-mile capability is provided, the DME ranges to 288 nautical miles when overridden by means of the 200-nautical mile range override control wire on P1-30. When not overridden, the modulator is turned off at all ranges greater than a nominal 200 nautical miles. (3) Override is accomplished by grounding control wires P2-19 or P1-30 as appropriate. The circuitry is arranged so that override control of both P2-19 and P9-30 may be accomplished by one override switch on the pilot's control box.
Receiver output	
Polarity	Positive.
Impedance	Less than 500 ohms. (Until a bearing unit is implemented, an isolating diode, A3CR31, and two resistors, A3R56-A3R57, are provided. These components prevent the disabling of the agc circuit when an external suppression pulse is inadvertently connected to the RCVR OUT jack. The normal 500-ohm output can be provided by removing these components or can be obtained at test point A3J8.)
Amplitude	Not less than 4 volts peak at the crest of the modulated standard TACAN signal. The amplitude remains constant within $\pm 20\%$ over the input range of -83 dbm to -20 dbm.
Warning flag	(1) The 860E-2 provides a flag control switch that indicates a "not locked-on" condition. The switch is capable of controlling at least 0.5 ampere at 30 volts d-c. As part of the warning flag system, the 860E-2 provides 27.5 volts (Cont)

Table of Equipment Specifications (Sheet 8 of 10)
Figure 5



CHARACTERISTIC	SPECIFICATION
Warning flag (Cont)	(Cont) d-c +10%, -24% with at least 0.5 ampere capacity through an isolating diode to P1-9. (2) With the proper internal jumper connections, the 860E-2 causes the warning flag to appear: (a) Within 4 seconds after the 860E-2 goes into the memory mode of operation (fast flag). (b) When the 860E-2 completes the prescribed memory cycle without achieving lock-on (slow flag).
Self-test (optional)	The 860E-2 provides facilities for the incorporation of self-test circuitry. When activated by a ground potential on P1-21, the self-test circuit functions to break lock-on, cancel memory and slew the strobe inbound to slightly below 0 mile, reverse and lock on 0 mile. When the ground potential is removed from P1-21, the 860E-2 resumes normal operation. The self-test circuitry itself shall provide an accuracy of ± 0.1 nautical mile.
Maximum input signal level	The application of an on-channel DME interrogation signal at the search interrogation rate, as specified herein, at any signal level up to -10 dbw into the 860E-2 antenna connector does not damage or adversely affect the reliability of the equipment.
Time delay	The 860E-2 incorporates a solid-state time-delay circuit capable of inhibiting the transmitter for 60 ± 10 seconds after initial application of primary power.
Conducted interference	(1) Radio frequency energy in the frequency range from 90 kHz to 350 MHz from the 860E-2 under standard conditions does not exceed the following:

Table of Equipment Specifications (Sheet 8 of 9)
Figure 5



CHARACTERISTIC	SPECIFICATION
Distance trip output (optional)	(a) 200 microvolts between each cable terminal and ground when measured with a noise meter set to read average signal level. (b) 50 microwatts across a 50-ohm load on the antenna connector. (2) CW r-f energy in the frequency range from 960 to 1215 mc does not exceed -30 dbm with the exception that between 1015 and 1045 mc, the level does not exceed -47 dbm when measured across a resistive load of 50 ohms at the antenna connector. The 860E-2 provides facilities for the incorporation of a single make-contact switch to provide a binary signal (ground) on P1-32 when the strobe is between -1.6 ± 0.4 and 12.5 ± 2.5 nautical miles. When the 12.5-nautical-mile trip switch is used for control of autopilot cutout over the cone of a VORTAC station, the following conditions must be satisfied: (1) When alarm flag is covering, the autopilot must be switched to heading. (2) When velocity memory is used, fast flag must be used.
Signal controlled search	The 860E-2 is placed in standby automatically upon loss of receive signal except as follows: (1) During memory (2) When the self-test control lead is grounded, and (3) When the indicator is between the range limit and maximum range.

Table of Equipment Specifications (Sheet 9 of 9)
Figure 5

3. EQUIPMENT DESCRIPTION.

A. Mechanical Description.

(1) 860E-2 Distance Measuring Equipment.

The 860E-2 is housed in a 1/2 ATR case with front and rear extensions. Electrical connections to the 860E-2 are made at the rear of the unit through two type DPA-32-33P connectors which mate with the jacks on the required associated shockmount and



through two type BNC and one type C coaxial connectors at the front of the unit. The chassis of the 860E-2 is the mounting base for two plug-in modules and five circuit boards. Each module and circuit board is constructed with a plug-in connector and a locating keying pin. The locating keying pins prevent incorrect placement of the sub-units. Test points are provided for examination of significant voltages and waveforms. The transmit/receive channel which has been selected by the remote control unit is visible from the rear top of the unit; a coarse distance indication is visible from the front of the unit; X or Y channel identification is visible on the left side of the unit.

The modules, boards, and subassemblies which make up the 860E-2 are listed in figure 6 and identified in figures 8 and 9.

A list of the fuses contained in the 860E-2 is given in figure 7.

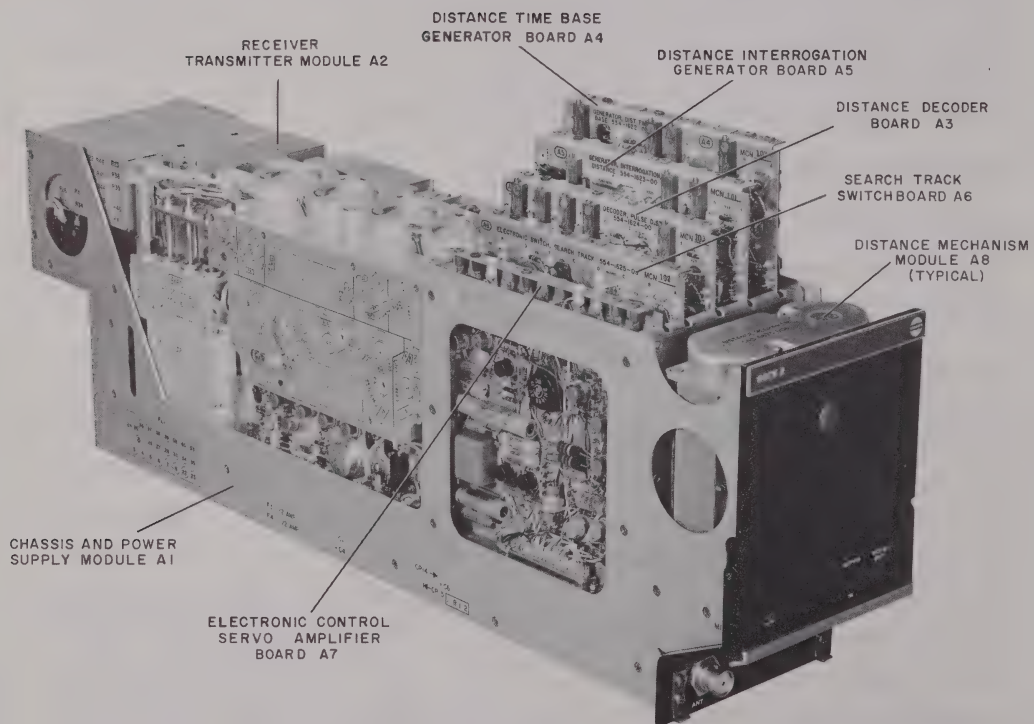
MODULE, BOARD, OR SUBASSEMBLY	DESIGNATION	COLLINS PART NUMBER
Chassis and power supply module	A1	554-1621-00
Receiver transmitter module	A2	554-1627-00
Channel selector subassembly	A2A1	554-1632-00
Frequency multiplier amplifier subassembly	A2A2	554-1630-00
Power amplifier subassembly	A2A3	554-1628-00
Modulator subassembly	A2A4	554-1629-00
Preselector subassembly	A2A5	554-1633-00
If. amplifier subassembly	A2A6	554-1631-00
Distance decoder board	A3	554-1624-00
Distance time base generator board	A4	554-1622-00
Distance interrogation generator board	A5	554-1623-00
Search/track switch board	A6	554-1625-00
Electronic control-servo amplifier board	A7	554-1626-011
200-mile distance mechanism module	A8	528-0455-004
300-mile distance mechanism module	A8	528-0470-005
300-mile distance mechanism module	A8	528-0470-006
Echo protector circuit	A9	772-8818-001

Modules, Boards, and Subassemblies
Figure 6

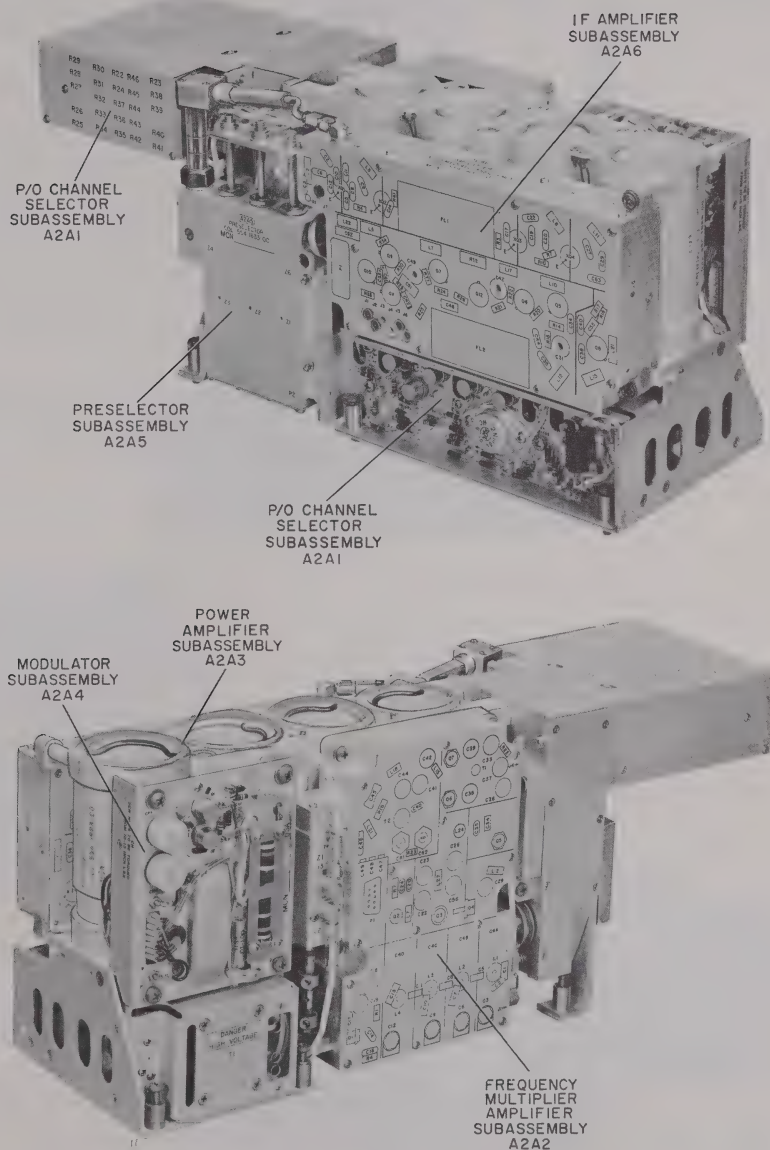


SYMBOL	LOCATION	TYPE
F1	A1	1.5 amp, normal blow
F2	A1	1.0 amp, slow blow
F3	A1	0.5 amp, normal blow
F4	A1	1.5 amp, normal blow

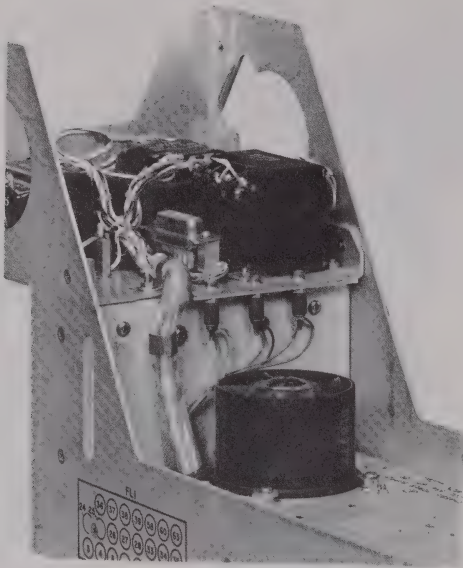
Fuses
Figure 7



860E-2 Distance Measuring Equipment, Module Identification
Figure 8



Receiver Transmitter Module, Subassembly Identification
Figure 9



TPO-6028-017

860E-2 DME Chassis; Chassis
with EPC Installed (Below)
Figure 9A



(2) 349D-3B Shockmount.

The 349D-3B Shockmount, figure 10, provides a mounting base for the 860E-2. Electrical connections are made through two DPA-32-33S-3-A101 connectors which mate with rear connectors on the 860E-2.

(3) 237Z-1 Antenna.

The 237Z-1 Antenna, figure 11, is a blade monopole antenna used with DME and transponder equipment. The 237Z-1 is intended for pulsed transmission and reception between 960 and 1215 MHz. The 237Z-1 is made of molded glass fiber in which the radiating element is hermetically sealed and imbedded in foamed plastic to prevent vibration of the element. The 237Z-1 is mounted to the bottom of the aircraft fuselage by six no. 6 F.H. screws. The type HN connector of the 237Z-1 goes through a clearance hole drilled in the bottom of the fuselage.

(4) 339D-1, 339D-3B, 339D-3C, and 339D-3D Distance Indicators.

The 339D-1, 339D-3B, 339D-3C, and 339D-3D Distance Indicators are general purpose indicators which operate from the output of either a DME or dopper navigation system. The 339D-1/3B/3C/3D conform to ARINC indicator specifications for these applications.



349D-1 Shockmount
Figure 10



When operating as a part of the DME system, the indicator will register the distance of the aircraft from a fixed vortac or tacan station. Figure 12 lists the unique characteristics of the distance indicators.

B. Electrical Description.

The 860E-2 Distance Measuring Equipment electronically measures the line-of-sight distance from an aircraft to a fixed tacan or vortac station. Descriptions of the various modules and sub-units follow. A list of the crystals used in the 860E-2 and their corresponding frequencies is given in figure 13.

(1) Chassis and Power Supply Module A1.

The chassis and power supply provides mounting facilities and inter-connecting wiring for the plug-in modules and boards and the required connectors to couple the 860E-2 to associated equipment. Located in module A1 is the power supply to convert 115 volts ac to the required voltages. The blower and optional elapsed time indicator are also located in the chassis and power supply along with the optional primary power relay. A time-delay circuit is located in module A1 to delay the application of high voltage pulses to the plates of the cavity tubes until the tubes are heated.



237Z-1 Antenna
Figure 11

	SINGLE INDICATOR	DUAL INDICATOR	RED LIGHTING	WHITE LIGHTING	REAR MOUNTING	FRONT MOUNTING
339D-1	X		X			X
339D-3B		X	X		X	
339D-3C		X	X		X	X
339D-3D		X		X	X	X

Distance Indicator Characteristics
Figure 12



(2) Receiver Transmitter Module A2.

(a) Channel Selector Subassembly A2A1.

The channel selector subassembly contains the resistance-bridge Autopositioner* that allows remote selection of the desired transmit/receive channel. The crystal-controlled high- and low-frequency oscillators and mixers are also contained in the channel selector subassembly.

SYMBOL	FREQUENCY (MHz)	SYMBOL	FREQUENCY (MHz)
LOW FREQUENCY OSCILLATOR		HIGH FREQUENCY OSCILLATOR	
Y1	9.8629	Y11	32.8037
Y2	9.9046	Y12	33.2204
Y3	9.9463	Y13	33.6370
Y4	9.9880	Y14	34.0537
Y5	10.0296	Y15	34.4704
Y6	10.0713	Y16	34.8870
Y7	10.1130	Y17	35.3047
Y8	10.1546	Y18	35.7204
Y9	10.1963	Y19	36.1370
Y10	10.2380	Y20	36.5537
TIMING OSCILLATOR		Y21	36.9704
Y1	4045.6 Hz	Y22	37.3870
		Y23	37.8037

Crystal Frequencies
Figure 13

*Registered in U.S. Patent Office



(b) Frequency Multiplier Amplifier Subassembly A2A2.

The frequency multiplier amplifier subassembly contains the Autopositioner-tuned, 45-mc, bandpass filter that is used to filter the signal from the mixer located in channel selector subassembly A2A1. Also contained in frequency multiplier amplifier subassembly A2A2 is a 1-stage 45-mc amplifier, three X2 multipliers, a 3-stage amplifier, and an X3 multiplier. These amplifiers and multipliers increase the input signal in frequency and amplitude. The CW output signal is the input to the power amplifier and the injection signal for the first mixer.

(c) Power Amplifier Subassembly A2A3.

The power amplifier subassembly contains four plate-pulsed cavity amplifiers to increase the power of the signal from the frequency multiplier amplifier subassembly A2A2. The amplifiers are tuned automatically by the Autopositioner mechanism when a channel is selected.

(d) Modulator Subassembly A2A4.

The modulator subassembly contains the circuitry to pulse modulate the cavity amplifiers in power amplifier subassembly A2A3. The trigger pulses used to activate the modulator are generated in the distance interrogation generator.

(e) Preselector Subassembly A2A5.

The preselector subassembly contains a 3-cavity preselector and a crystal mixer to mix the reply signal with the injection signal from frequency multiplier amplifier subassembly A2A2. The 3-cavity resonators in the preselector are tuned automatically by the Autopositioner tuning mechanism when a channel is selected.

(f) IF. Amplifier Subassembly A2A6.

The if. amplifier subassembly contains a 4-stage, automatic gain controlled 63-mc amplifier to amplify the first if. signal from preselector subassembly A2A5. Also contained in if. amplifier subassembly A2A6 is a crystal-controlled 63- to 10.7-mc converter, a 2-stage second if. amplifier with a 10.7-mc filter between stages, a signal detector, a video amplifier, and a deblocker amplifier.

(3) Distance Decoder Board A3.

The distance decoder board provides decoded distance, tone identification, and azimuth information from the composite tacan signal. The distance information is applied to the distance measuring circuits. The tone identification is applied to pins P2-23 and P2-24. The azimuth information is applied to jack J11 and may be used to operate an optional external azimuth box. The agc voltage is also derived in distance decoder board A3.

(4) Distance Time Base Generator Board A4.

The distance time base generator board contains the 4045.6-cps crystal-controlled oscillator that is used to establish a time base for the distance measuring operation. Also contained in the distance time base generator board is the phase shift circuitry



to encode the interrogation pulses for both the X and Y channels, the resolver phase shift circuits, and the signal controlled search circuits.

(5) Distance Interrogation Generator Board A5.

The distance interrogation generator board contains the interrogation rate countdown circuit and the suppressor pulse generator. Also contained in the distance interrogation generator board are the 200/300-mile sweep circuit, controlled by the range potentiometer located in the distance mechanism module; the selector gate generator; and the range gate countdown circuit.

(6) Search/Track Switch Board A6.

The search/track switch board contains the range gate generator and the ramp voltage generator. An error detector is also located in the search/track switch board to determine if the distance reply pulses are in the center of the range gate. The search/track switch, the memory and prememory circuits, the interrogation prf switch, and the circuitry to control the signal applied to the distance servo motor are also located in the search/track switch board.

(7) Electronic Control-Servo Amplifier Board A7.

The electronic control-servo amplifier board contains the flag and memory logic circuits, the self-test circuits, and the servo amplifiers. The circuits in the electronic control-servo amplifier board also control the override function, turn off the modulator when required, and control the search limit.

(8) 200-Mile Distance Mechanism Module A8.

The 200-mile distance mechanism module contains a resolver, a range potentiometer, an optional 12.5-mile trip switch, and a motor-rate generator. Geared to the motor-rate generator are two synchro transmitters, a hundreds switch, and two optional computer-potentiometers. The synchro transmitters and hundreds switch supply distance information to the distance indicator, and the optional computer-potentiometers provide distance information for operation of a navigation computer.

(9) 300-Mile Distance Mechanism Module A8 (528-0470-005).

The 300-mile distance mechanism module contains a resolver and a motor-rate generator. Geared to the motor-rate generator are three synchro transmitters, one cam switch, a distance measuring potentiometer, and two computer-potentiometers. The synchro transmitters supply distance information to the distance indicator. The computer-potentiometers provide distance information for operation of a navigation computer.

(10) 300-Mile Distance Mechanism Module A8 (528-0470-006).

The 006 status numbered 300-mile distance mechanism module is the same as the 005 status except that the motor-rate generator is geared to a 12-mile trip switch as well as the three synchro transmitters, two range limit switches, distance measuring potentiometer, and the two computer-potentiometers. Refer to step (9).



(11) Echo Protector Circuit A9.

This circuit prevents the 860E-2 from remaining locked on an echo reply, at any distance up to the range-limit setting, for more than approximately 10 seconds. EPC components are mounted on two metal boards; most of the components are contained in four encapsulated "blue" modules.

(12) Control Units.

Any control unit with resistive bridge tuning per ARINC Characteristic 521C is capable of controlling the 860E-2 DME. Control units recommended for use with the 860E-2 are Collins 313N-2D, 313N-3D, and 614U-7/8. The 614U-7/8 Control Unit has 50-kHz channel spacing and may be used to control other navigation receivers when controlling the 860E-2. The 313N-2D and 313N-3D Control Units are capable of controlling both navigation and communication equipment. The 313N-2D has 25-kHz channel spacing for communication tuning, and the 313N-3D has 50-kHz channel spacing. Both control units have 50-kHz channel spacing on the navigation tuning portion. The 313N-2D and 313N-3D have 2 x 5 switching and the 614U-7/8 has 11-wire (re-entrant) switching for control of navigation receivers.

NOTE: When the function control on the control unit used with the 860E-2 is in OFF position, a ground must be retained on the standby line. The ground prevents transmitter "on" operation in 860E-2 DME's that are not provided with a primary power control relay.



C. Special Features.

(1) Reciprocating Search.

When the 860E-2 loses lock-on or is channeled to a new station when the indicator reads less than 50 miles, the reciprocating search circuits slew the strobe to slightly below zero before search begins. This saves the time formerly required to drive the strobe to zero by driving it past 200. The reciprocating search circuits also limit the search cycle of the 860E-2 on nonoverridden short range channels. The search cycle on short range channels is from 0 to the range limit with the modulator on and back from the range limit to 0 with the modulator off.

(2) Signal Controlled Search.

A signal controlled search feature has been incorporated into the 860E-2 to prevent unnecessary search when the 860E-2 and VOR receiver are tuned to a VOR only station or when the selected ground station is out of range. When the signal detected by the receiving circuits of the 860E-2 is below a usable level, the signal controlled search circuits place the 860E-2 in standby. When the received signal increases to a usable level, full power is applied to the 860E-2 for normal operation. When the 860E-2 is channeled to a station with no DME and the indicator reads less than 50 miles, the strobe stops; when the distance indicator reads more than 50 miles, the strobe is driven to zero and stops.

(3) Echo Protector Circuit.

A problem is caused by the inability of the TACAN/DME ground stations to suppress replies to air-to-ground echoes that occur after the 60-microsecond ground station dead time. If the DME locks on these false replies, the distance information displayed can be in error from five to more than 20 miles. This condition can last from a few seconds to as long as several minutes, depending on the terrain and reflecting objects.

The 860E-2, due to its basic design, provides a high probability of locking on the correct reply rather than a false reply: if lock-on is lost at ranges of approximately 50 miles or less, the 860E-2 starts outbound search from zero mile to assure that the correct reply is encountered first. There is, however, a possibility that blanking of the desired reply by an identification transmission, or other momentary loss of the valid reply signal, could result in lock-on to a false reply signal.

If the EPC (echo protector circuit) detects that the 860E-2 is locked on an echo reply pulse, the EPC causes the 860E-2 to break lock, turn off the transmitter, and slew inbound to zero mile. The 860E-2 then searches outbound from zero mile and locks on the correct reply pulse. The EPC is disabled when the 860E-2 is in search mode or standby. The EPC also performs monitoring, which will cause the 860E-2 flag to come into view at the indicator in the case of a single failure of most of the EPC parts.

D. System Description.

(1) Distance Measuring Operation.

The distance measuring operation begins when the transmitter portion of the 860E-2 DME sends out a pair of interrogation pulses at a frequency between 1025 and 1150 MHz inclusively. These interrogation pulses are received by the selected TACAN or VORTAC ground station. The ground station, after a fixed time delay, transmits a pair of reply



pulses either 63 mc above or below the interrogation frequency. These reply pulses are received and detected in the receiver portion of the 860E-2 DME and applied to the computing circuits. The computing circuits measure the time interval between the transmission of interrogation pulses and the reception of reply pulses. The time interval, which is proportional to the slant distance between the aircraft and the ground station, is converted to distance information and displayed on the DME distance indicator.

(2) Ground Stations.

(a) TACAN.

A TACAN ground station has the capabilities to reply to DME distance interrogation signals and also to transmit bearing information and identification signals. The bearing information consists of amplitude-modulated pulses and is used mainly by the military as a source of bearing data. The identification signals are transmitted at intervals of 35 seconds and consist of pairs of pulse pairs at a fixed repetition rate of 1350 pulse pairs per second.

(b) VORTAC.

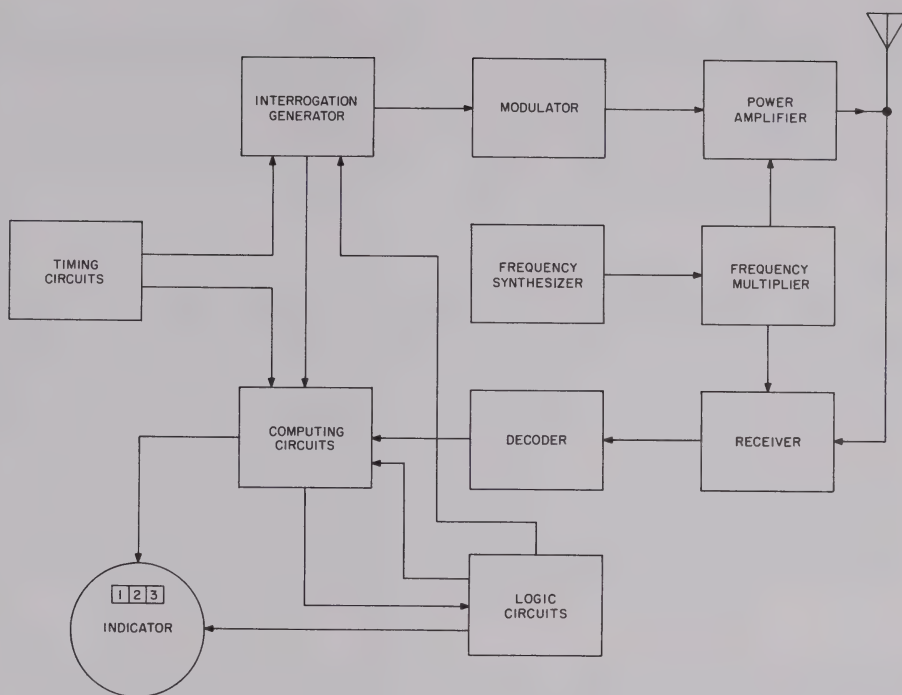
A VORTAC station consists of a TACAN station as described above and a VOR transmitter to provide bearing information for aircraft equipped with VOR receivers. The VOR transmitter also transmits identification signals. The identification signals from the VOR transmitter and TACAN transmitter are synchronized so that one DME identification tone is received after every fourth VOR identification tone. The DME signal can be recognized by its higher tone.

4. SIMPLIFIED BLOCK DIAGRAM THEORY OF OPERATION. (Refer to figure 14.)

The timing and logic circuits provide the interrogation generator with the required signals to produce coded pulses to modulate the transmit signal. The timing circuits provide the interrogation generator with the information required to code the pulses. The logic circuits provide the interrogation generator with the information required to control the pulse interrogation rate. The interrogation pulses from the interrogation generator are applied to the modulator.

The frequency synthesizer generates a signal at $1/24$ of the transmit frequency. This signal is frequency multiplied by 24 in the frequency multiplier and applied to the power amplifier. The power amplifier increases the signal level of the output from the frequency multiplier to the required transmit level. The signal is pulse modulated by the action of the modulator before transmission.

The ground station reply signal is applied to the receiver section where it is heterodyned with an injection signal of the same frequency as the transmit signal. The ground station reply signal frequency is either 63 mc above or below the transmit signal frequency on all channels. Further heterodyning is done in the receiver to produce a second i-f of 10.7 mc. The reply signal is then demodulated and the detected pulses are applied to the decoder. The decoder separates the distance replies from noise and other information transmitted by the ground station (see paragraph 3.B.(2)), and applies the distance reply pulses to the computing circuits. The computing circuits use the information from the timing circuits and measure the time lapse between interrogation and reply pulses and convert this into distance information to drive the distance indicator.



860E-2 Distance Measuring Equipment Simplified Block Diagram
Figure 14

The logic circuits receive information from the computing circuits to control warning flag and memory operation.

5. DETAILED BLOCK DIAGRAM THEORY OF OPERATION. (Refer to figure 15.)

NOTE: The letters in parentheses refer to the waveforms in figures 16, 17, and 18.

A. Frequency Synthesizer.

The outputs of a high- and low-frequency oscillator are mixed in the frequency synthesizer to produce an output at $1/24$ of the transmit frequency. The output of the frequency synthesizer is applied to the frequency multiplier.

B. Frequency Multiplier.

The signal from the mixer in the frequency synthesizer is applied to an Autopositioner-tuned filter that selects the sum frequency of the oscillator signals. The filtered signal is then amplified and applied to an X2 multiplier. The output of the X2 multiplier is amplified and applied to two X2 multipliers and an X3 multiplier in series to increase the frequency



of the signal to the transmit frequency. The output of the X3 multiplier is applied to the power amplifier and to the mixer in the receiver circuits as the first injection signal.

C. Power Amplifier.

The plate-pulsed power amplifier increases the power of the signal from the frequency multiplier to the required transmit level. The pulse-modulated output of the power amplifier is applied to the antenna through a diplexer. The diplexer allows one antenna to be used for both transmitting and receiving DME signals.

D. Receiver.

The ground station reply signal received by the antenna is applied to the preselector through the diplexer. The preselector provides image rejection and filters the received signal. The output of the preselector is heterodyned in the mixer with the injection signal from the frequency multiplier. The mixer output is applied to the first i-f amplifier. Since the frequency of the DME transmit (injection) signal is always 63 mc away from the ground station reply signal, the mixer has an output at 63 mc which is selected as the first i-f. The first i-f amplifier is automatic gain controlled and frequency selective at 63 mc. The output of the first i-f amplifier is applied to the 63- to 10.7-mc converter. The output of the converter (10.7 mc) is applied to the second i-f amplifier. The output of the second i-f amplifier is applied to the signal detector. The signal detector rectifies and filters the i-f signal to provide video pulses at its output. The output (A) of the signal detector is applied directly to the deblocker amplifier in the decoder and through the video amplifier to the decoder.

E. Decoder.

The detected pulses from the receiver are applied to a comparator in the decoder. The output (B) of the comparator consists of pulses of fixed amplitude for input pulses large enough to switch the tunnel diode. The output of the comparator is amplified and applied to the pulse-shaping multivibrator. The output of the amplifier is shorted by the suppressor amplifier when a pulse is received from the suppressor multivibrator in the 860E-2 or from other pulse equipment connected to the SUPPR jack. This suppression disables the decoding circuits when the 860E-2 or other pulse equipment is transmitting. This prevents the agc circuits from reacting to properly coded local pulses having a high prf.

The pulse-shaping multivibrator is triggered by the output of the amplifier. The output (C) of the pulse-shaping multivibrator is a pulse approximately 1 usec wide. The output pulse is applied to a 9.8-usec delay line and through a differentiator and an OR-circuit to a coincidence circuit. The delayed pulse from the 9.8-usec delay line is applied to an 18-usec delay line and a comparator. The comparators square the outputs of the delay lines. The resulting pulse width is 4 usec. Comparator outputs are applied to the time-delay selector.

The time-delay selector applies either the 9.8-usec delayed pulse (D) or the 27.8-usec delayed pulse to the coincidence circuit. The 9.8-usec delay is selected if the 860E-2 is tuned to an X channel, and the 27.8-usec delay is selected if the 860E-2 is tuned to a Y channel.

The coincidence circuit compares the delayed output (D) with the nondelayed output (E) from the pulse-shaping multivibrator or the deblocker amplifier. If the received pulses are properly spaced, 12 usec on X channels, 30 usec on Y channels, the second pulse of non-delayed pulse pair (E) will be applied to the coincidence circuit at the same time the first pulse of delayed pulse pair (D) is applied to the coincidence circuit. If the pulses are time coincident, the coincidence circuit then has an output (F) to trigger the reply multivibrator.



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In the event that the amplitude of the reply signals to the 860E-2 are instantaneously high, the agc circuits may not have time to react. This might happen if the 860E-2 is channeled to a station when the aircraft is nearby. If the receiver is in saturation and the leading edge of the second pulse of a pulse pair is not well enough defined, the first comparator will produce an output from the first pulse only. The multivibrator will then be triggered by only the first pulse of the pair, and a second nondelayed pulse from the multivibrator will not be present in the coincidence circuit to permit decoding. In this case, a second nondelayed pulse is applied from the signal detector to the coincidence circuit through the deblocker amplifier and differentiator to permit decoding and allow the agc to build up to the point where the decoder operates in the normal manner.

The output (G) of the reply multivibrator is applied to an AND-circuit, to the identification ringing circuit, and to the computing circuits. The AND-circuit receives pulses from the video amplifier in the receiver circuits along with the pulses from the reply multivibrator. The pulses from the video amplifier contain pulse amplitude information necessary for the operation of the agc and bearing circuits. The AND-circuit allows the video amplifier output pulses to pass if they are time coincident with the decoded pulses from reply multivibrator (H). This blocks noise and pulses not properly coded from being applied to the agc and bearing circuits.

The bearing amplifier amplifies the pulses from the video amplifier that have passed through AND-circuit and applies them (H) to the RCVR jack on the front panel of the 860E-2 and to the agc circuits. The agc circuits integrate the pulses and generate a voltage to control the gain of the first i-f amplifier. The audio ringing circuit detects the presence of a 1350-kc tone and applies the tone through an amplifier to the output jack.

F. Timing Circuits.

The timing circuits consist of a 4045.6-cps oscillator. The output of the timing oscillator (I) is applied to the interrogation generator which encodes the interrogation pulses and to the computing circuits as a distance measuring time base.

G. Interrogation Generator.

The 4045.6-cps signal from the timing circuits is applied to pulse formers no. 1 and no. 2 through a 12-usec phase lag circuit and a 24-usec phase lead circuit. When the 860E-2 is tuned to an X channel, the 24-usec lead circuit is inactivated and provides zero phase shift. The phase difference between the signals applied to the pulse formers is then 12 usec on X channels and 36 usec on Y channels. The output (K) of pulse former no. 2 is a positive pulse at every negative-going crossing of the applied sine wave (J). The output pulses from pulse former no. 2 and the output of the prf multivibrator are applied to an AND-circuit. The frequency of the prf multivibrator is controlled by the search/track switch in the logic circuits. When the 860E-2 is in search mode, the frequency is 146 pps, and when the 860E-2 is in track mode, the frequency is 21 pps. The pulses (N) from pulse former no. 2, that are coincident with the pulses from prf multivibrator, trigger the countdown multivibrator. The on time of the prf is 350 msec long so that at least one of the pulses from pulse former no. 2 passes through the AND-circuit. The output (O) of countdown multivibrator and the pulses (L) from pulse former no. 1 are applied to an AND-circuit. The pulses (P) from pulse former no. 1 that fall within the pulses from countdown multivibrator are applied to the modulator as the no. 1 modulation pulse. The no. 1 modulation pulse also triggers the suppression multivibrator. The output (Q) of the suppression multivibrator is applied to the SUPPR jack on the front panel and to the suppression amplifier to disable the decoding



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circuits. The output from pulse former no. 2 is applied to an AND-circuit with the output of the suppressor multivibrator. The pulse from pulse former no. 2, immediately following the no. 1 modulation pulse, is passed by the AND-circuit and used as the no. 2 modulation pulse (R). The no. 2 modulation pulse is also applied to the computing circuits to provide a time reference.

H. Modulator.

The modulator applies a high voltage pulse to the plates of the cavity amplifiers in the power amplifier for every modulation pulse input.

I. Computing Circuits.

The sweep multivibrator is triggered by the no. 2 modulation pulse. The output of sweep multivibrator (S) is applied to the linear sweep generator. Linear sweep generator output (T) is applied to a comparator with the range potentiometer voltage. The comparator produces an output to trigger the selector gate generator when the voltage from the linear sweep generator equals the voltage from the range potentiometer. The time delay between the no. 2 modulation pulse and the comparator output is then analogous to distance, since the potentiometer voltage is determined by the distance. Selector gate generator output (V) and the output of pulse former no. 3 are applied to an AND-circuit. The output (X) of pulse former no. 3 is a positive pulse at every negative going crossing of phase-shifted sine wave (W) from the timing circuits. The amount of phase shift introduced into the signal from the timing circuits is determined by the position of the resolver.

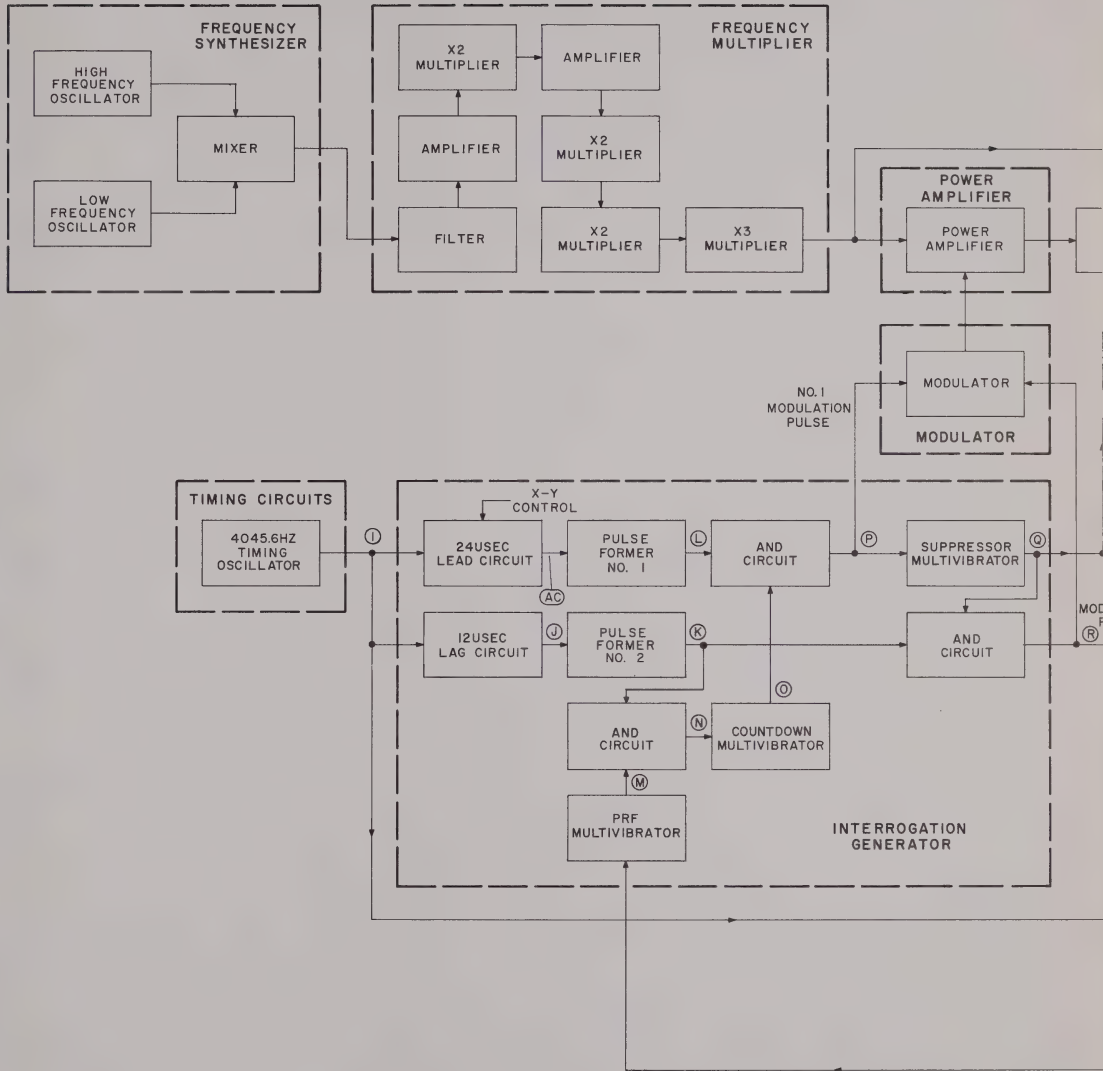
The output (Y) of the AND-circuit triggers the range gate generator. The output (Z) of range gate generator is applied to an AND-circuit with the decoded distance replies from the decoder and to the ramp voltage generator. If the distance reply falls within the range gate, pulse (AB) is applied to the error detector with the output of ramp voltage generator (AA) and to the search/track switch in the logic circuits.

The error detector determines whether distance reply (AB) is in the positive or negative half of ramp voltage generator output (AA) and applies a corresponding positive or negative voltage to the chopper. The output of the chopper, an a-c signal whose phase is dependent on the polarity of the signal from the error detector, is applied to the servo drive control in the logic circuits. If the 860E-2 is in track, the chopper output is applied to the servo motor through the servo amplifier. The servo motor then drives the resolver and the range potentiometer. The change in position of the resolver produces a time change in the output of pulse former no. 3. This change in output of pulse former no. 3 adjusts the range gate to center the distance reply in the range gate (zero the error signal).

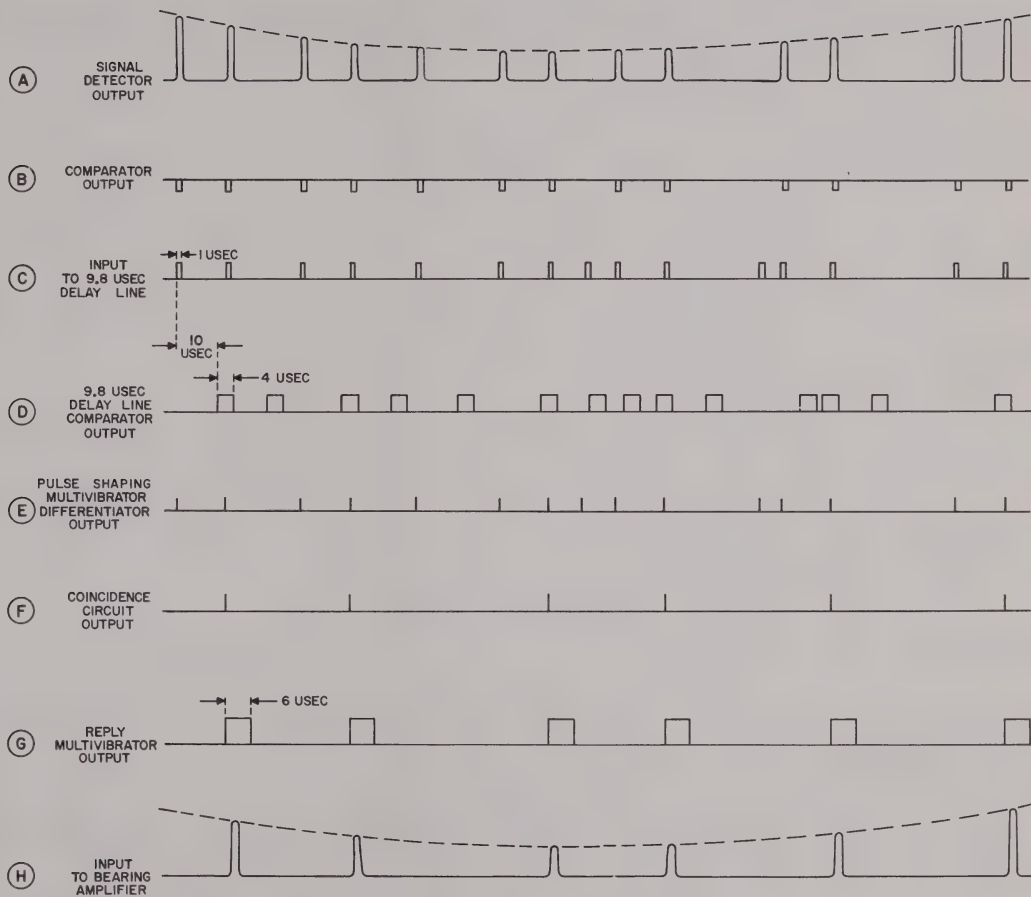
If the 860E-2 is in search, a signal is applied to the servo amplifier from the servo drive control. The servo motor drives the range potentiometer and the resolver to adjust the selector gate and the pulse former no. 3 output until the distance replies are within the range gate.

J. Logic Circuits.

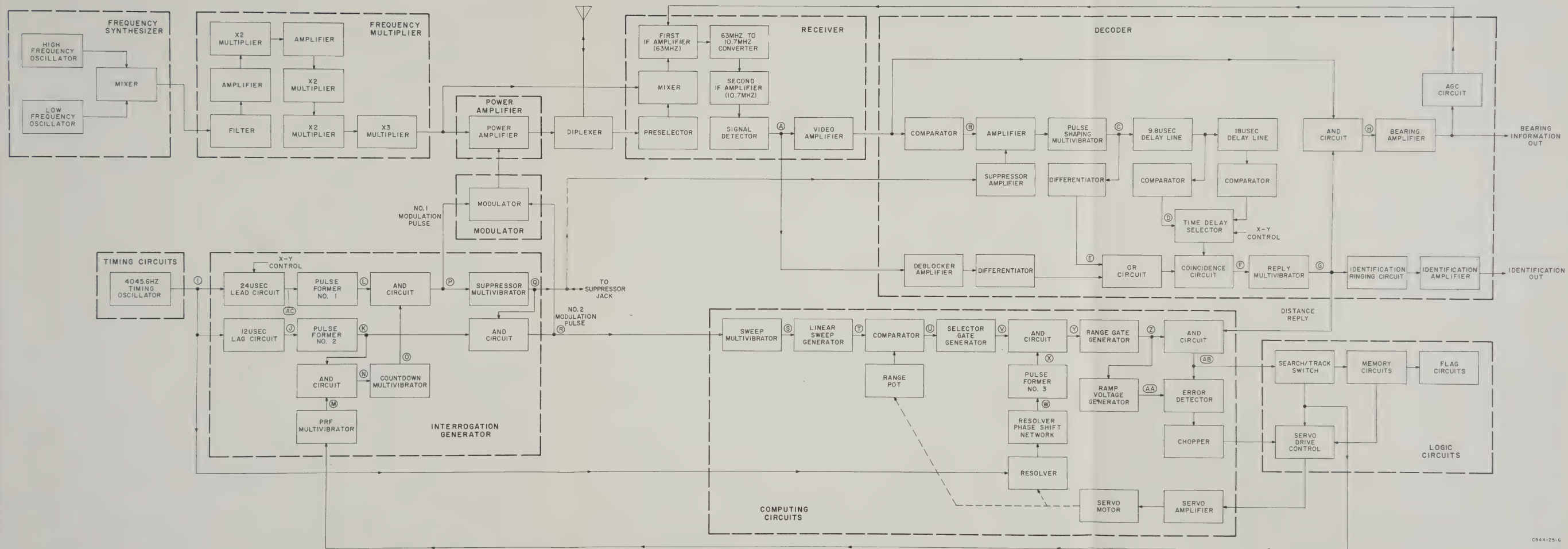
The search/track switch in the logic circuits integrates the gated distance replies from the computing circuits. If the number of replies is sufficiently high, the search/track switch



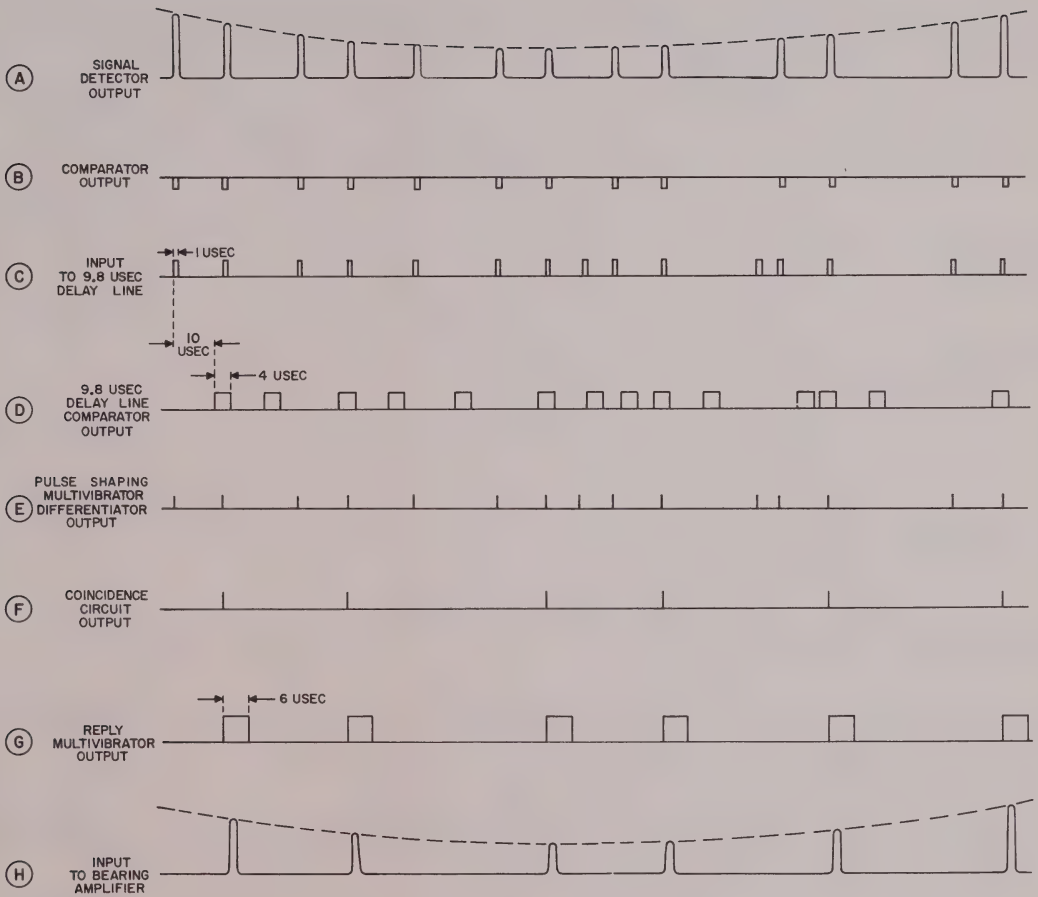
860E-2 Distance Measuring Equipment, Detailed Block Diagram
Figure 15



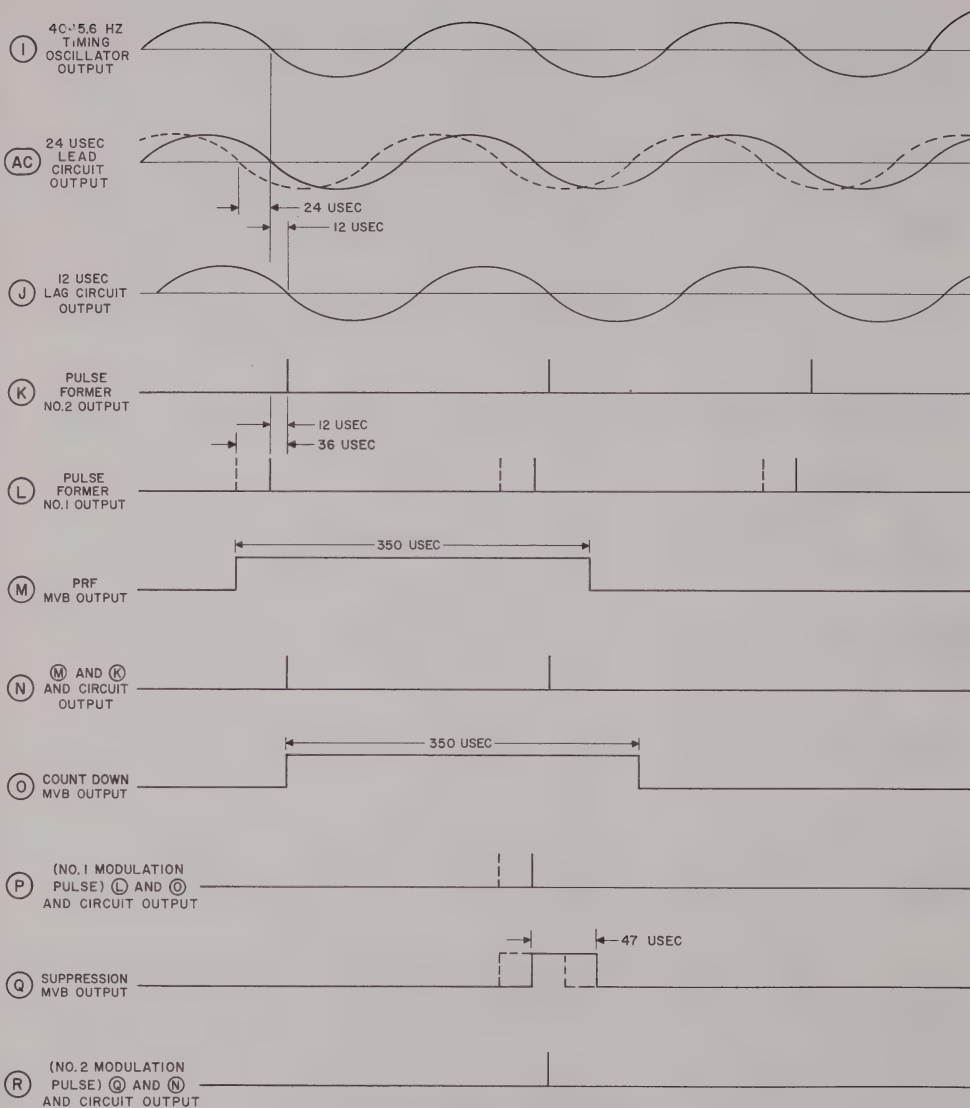
Decoding Circuits Waveforms
Figure 16



860E-2 Distance Measuring Equipment, Detailed Block Diagram
Figure 15



Decoding Circuits Waveforms
Figure 16



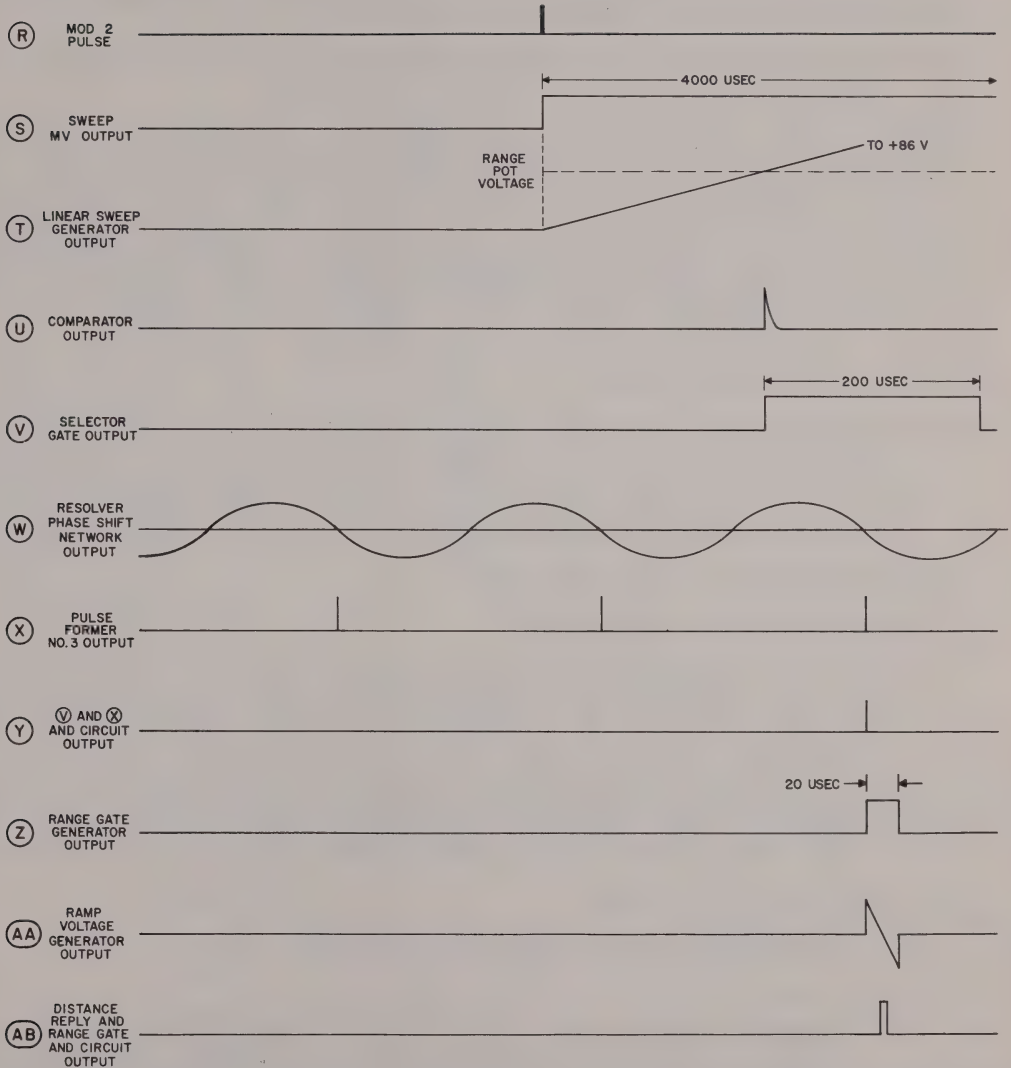
NOTE:
DASHED WAVEFORMS SHOW Y CHANNEL OPERATION.

C944-21-4

Interrogation Generator Waveforms
Figure 17



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Computing Circuits Waveforms
Figure 18



switches the 860E-2 to the track mode of operation. If the number of replies falls below a minimum level, the search/track switch switches the 860E-2 to the search mode of operation. The frequency of the prf multivibrator in the interrogation generator is controlled by the search/track switch. If the search/track switch is in search, the frequency is 146 pps. If the search/track switch is in track, the frequency is 21 pps.

The memory circuits receive the search/track information, control the action of the flag, and supply memory information to the servo motor drive control.

The servo drive control combines the information from the search/track switch and the memory circuits and controls the signal applied to the servo amplifier. If the 860E-2 is in track mode, the servo motor drive control applies the signal from the chopper to the servo amplifier. When the 860E-2 switches from track to search, the servo motor drive control applies the correct memory signal to the servo amplifier. The servo motor is stopped in 860E-2 DME models with static memory and is driven at the tracking rate it had prior to going into search in units with velocity memory. After the memory period is over, the servo motor drive control applies a search voltage to the servo amplifier. The servo motor then drives the range potentiometer and the resolver until lock-on occurs.

6. DETAILED THEORY OF OPERATION.

NOTE: The detailed theory of operation is divided into functional sections with a detailed block diagram theory on each section. Each functional section is further divided into smaller units with a detailed theory of operation and a description of test points and adjustments for each unit. An index is given at the end of this section (figures 75, 76, and 77) to help locate the description of a particular transistor circuit, test point, or adjustment.

A. Frequency Synthesizer. (Refer to figure 19.)

(1) Block Diagram Theory of Operation.

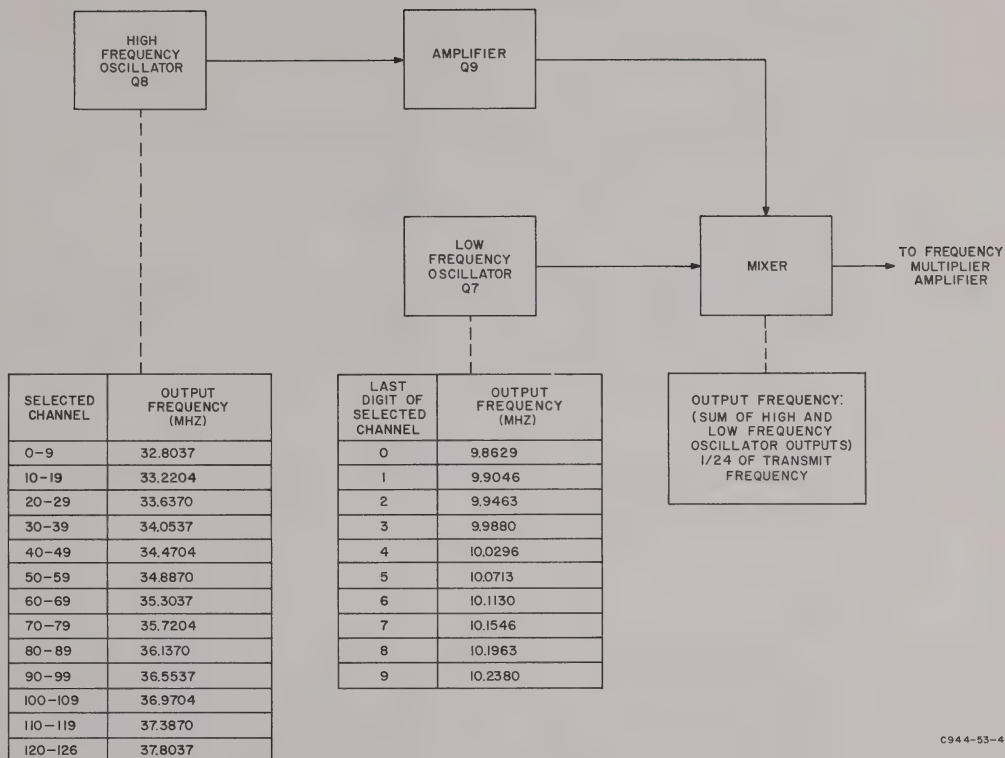
The frequency synthesizer generates a signal at $1/24$ of the transmit frequency by mixing the outputs of two crystal-controlled oscillators. The output frequency of high-frequency oscillator Q8 is determined by the tens and hundreds digits of the selected channel. The output frequency of low-frequency oscillator Q7 is determined by the units digit of the selected channel. The high-frequency oscillator output is amplified to provide a buffer between the high-frequency oscillator and the mixer. The signals are mixed and applied to the frequency multiplier amplifier. The sum of the high- and low-frequency oscillators is equal to $1/24$ of the transmit frequency.

(2) Detailed Theory of Operation.

(a) High-Frequency Oscillator Q8. (Refer to figure 20.)

1. Theory.

Transistor Q8 and associated circuitry form a crystal-controlled oscillator. Positive feedback is from the collector to the base through a selected crystal. The appropriate crystal is selected by Autopositioner-driven switches S9 and S10. The tuned circuit, consisting of L6 and C10, is capacitive at the oscillator frequency. This capacitance with inductor L7, selected inductor L, capacitor C7 and C8 and the input capacitance to Q8 form a pi matching network to match



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Frequency Synthesizer, Block Diagram
Figure 19

the collector impedance to the base impedance. The inductor L is selected by S13 to keep the pi network in tune so that the crystals are not pulled off frequency. The output, taken at voltage divider C7 and C8, is applied to amplifier Q9.

2. Adjustments.

Variable capacitor C10 is used for fine adjustment of the high-frequency oscillator.

(b) Amplifier Q9. (Refer to figure 20.)

1. Theory.

The signal from the high-frequency oscillator is amplified by transistor Q9. The collector circuit of Q9 is tuned to provide a resistive load for transistor



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Q9. The output of amplifier Q9, taken at the secondary of T4 is applied to the mixer.

2. Adjustments.

Variable capacitor C17 is adjusted to provide constant output power characteristics over the frequency range of the high-frequency oscillator.

(c) Low-Frequency Oscillator Q7. (Refer to figure 20.)

1. Theory.

Transistor Q7 and associated circuitry form a modified Colpitts oscillator. The crystal in the base circuit is selected by two Autopositioner-driven switches, S11 and S12. The output, taken from the junction of the crystal and C15, is applied through a pi matching network consisting of C15, L1 and C16 to the mixer.

2. Adjustments.

Variable capacitor C3 in the base circuit of Q7 is used for fine adjustment of the low-frequency oscillator.

(d) Mixer. (Refer to figure 20.)

1. Theory.

The high- and low-frequency oscillator outputs are mixed by the diode bridge mixer CR20. During one half-cycle of the high-frequency signal, the bridge diodes are conducting and the low-frequency signal is passed through the diode bridge to the output. During the other half-cycle of the high-frequency signal, the bridge diodes are reverse biased and the low-frequency signal is not passed through the bridge. The resulting chopped, low-frequency signal obtained at the output provides sum and difference frequencies. The output of the mixer is shunted by a 63-mc trap, L8 and C19, to reduce the presence of signals at 63 mc. Signals at 63 mc are present in the output of the mixer on channels 90 through 99. On these channels, twice the output of the high-frequency oscillator, minus the output of the low-frequency oscillator is in the passband of the i-f amplifier. Presence of this signal in the i-f amplifier will cause noise enhancement and an apparent increase in noise figure. The output of the mixer is applied to the frequency multiplier amplifier where the sum frequency is selected.

2. Adjustments.

Variable capacitor C19 is adjusted to obtain minimum signal at 63 mc at the output of the frequency synthesizer on channel 95.

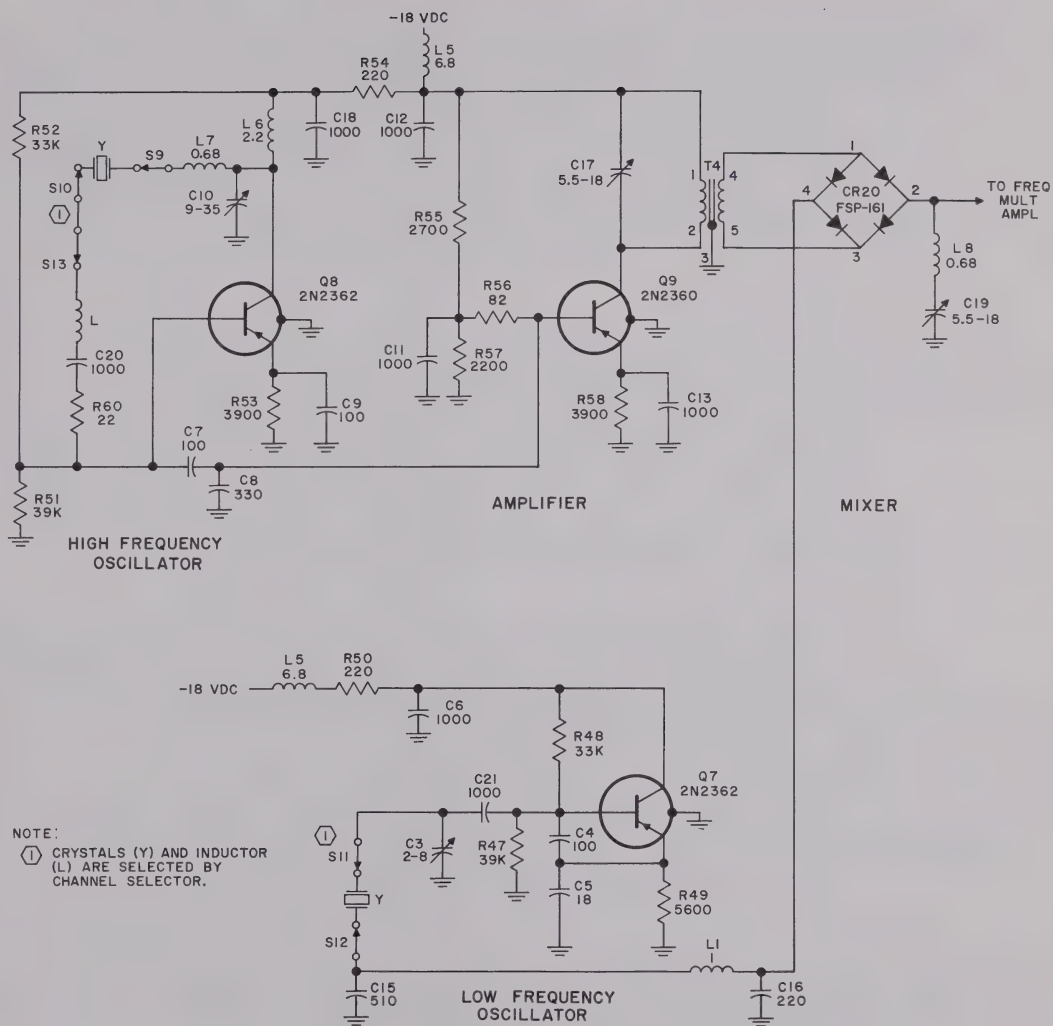
B. Frequency Multiplier Amplifier.

(1) General.

The frequency multiplier amplifier amplifies the output of the frequency synthesizer to the level required to drive the power amplifier and increases the frequency by a factor



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Frequency Synthesizer (P/O Module A2A1), Simplified Schematic Diagram
Figure 20



of 24. The frequency multiplier amplifier also provides the first injection signal to the receiver.

(2) Block Diagram Theory of Operation. (Refer to figure 21.)

The signal from the mixer in the frequency synthesizer is applied to the tracked filter in the frequency multiplier amplifier. The tracked filter is tuned by the Autopositioner when the desired channel is selected. The sum frequency of the mixer input signals is selected and applied to amplifier Q1. The output of amplifier Q1 is frequency doubled by X2 multiplier Q2 and applied to amplifier Q3, Q4, and Q5. The output of the amplifier is frequency doubled by X2 multiplier Q6 and Q7, frequency doubled by the X2 varactor multiplier and frequency tripled by the X3 multiplier V1. The output of the X3 multiplier is applied to the power amplifier and to the receiver.

(3) Detailed Theory of Operation.

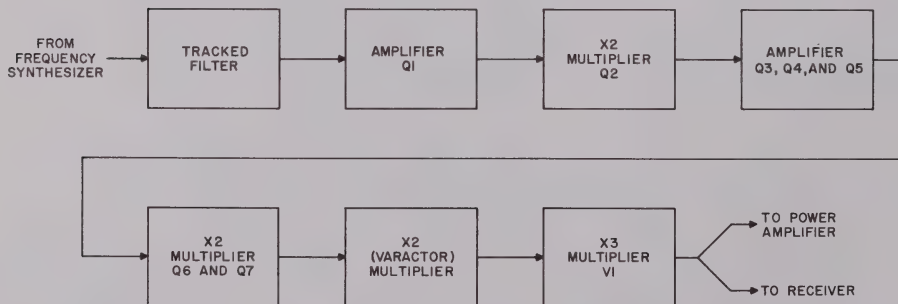
(a) Tracked Filter. (Refer to figure 22.)

1. Theory.

The tracked filter consists of four single-tuned circuits that are tuned by the Autopositioner in the channel selector (see paragraph 6.T.). Capacitors C1 and C2, and C13 and C14, are matching networks at the input and output of the tracked filter respectively. The tracked filter provides selectivity to remove spurious signals generated by the frequency synthesizer. The output of the tracked filter is applied to amplifier Q1.

2. Adjustments.

Variable capacitors C3, C6, C9, and C12 in the four tuned circuits are trimmers to compensate for small differences in the air capacitors. The blades on capacitors C4A, C4B, C4C, and C4D can be adjusted by bending, if necessary, to provide slope adjustment and improve linear tracking characteristics.



Frequency Multiplier Amplifier (P/O Module A2A2), Block Diagram
Figure 21



(b) Amplifier Q1. (Refer to figure 22.)

1. Theory.

Transistor Q1 operates as a class A amplifier and has a double-tuned output. The two tuned circuits, L5-C19 and L23-C18, are coupled by C64 and form a band-pass filter centered at approximately 45 mc. The output of Q1 is coupled to X2 multiplier Q2 through C50.

2. Adjustments.

Variable capacitors C19 and C18 are adjusted to provide the proper passband.

(c) X2 Multiplier Q2. (Refer to figure 22.)

1. Theory.

Transistor Q2 operates as an X2 frequency multiplier. The tuned circuit, consisting of inductor L7 and capacitor C22 in the collector circuit of Q2, is coupled through C54 to the tuned circuit consisting of C23 and L27 to form a band-pass filter centered at approximately 90 mc. The output of the filter is applied to Q3.

2. Adjustments.

Variable capacitors C22 and C23 are tuned to obtain the proper passband.

(d) Amplifier Q3, Q4 and Q5. (Refer to figure 22.)

1. Theory.

Transistors Q3, Q4 and Q5 form a frequency-selective, three-stage amplifier. Transistor Q3 is a double tuned amplifier with the tank circuits forming a band-pass filter centered at approximately 90 mc. The output of Q3 is applied to transistor amplifier Q4. The single-tuned circuit consisting of L12 and C29 is tuned to approximately 90 mc. The output of the tuned circuit, taken at the tap on L12, is applied to amplifier Q5. The output of Q5 is coupled by C34 to transformer T1 which is tuned by C36 and C37 to approximately 90 mc. The output of T1 is applied to X2 multiplier Q6 and Q7.

2. Adjustments.

Variable capacitors C26, C29 and C56 are adjusted to obtain the proper passband. Variable capacitor C33 is adjusted to obtain maximum power output.

(e) X2 Multiplier Q6 and Q7. (Refer to figure 22.)

1. Theory.

The secondary of transformer T1 is applied to transistors Q6 and Q7 that form a push-push doubler circuit. The secondary of T1 is tuned by C36 and C37 to



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have a center frequency of approximately 90 mc. The input to Q6 and Q7 is balanced by C36 and C37. The resonant circuit, consisting of C41 and L15 in parallel with primary of T2, forms a band-pass filter centered at approximately 180 mc. The output of T2 is applied to the X2 varactor multiplier.

2. Adjustments and Test Points.

Variable capacitors C36, C37, and C41 are adjusted to obtain maximum power output across the frequency band. Test point J4 permits examination of the signal at 1/12 of the transmit frequency.

(f) X2 Varactor Multiplier. (Refer to figure 22.)

1. Theory.

Varactor diodes CR1 and CR2 and associated circuitry make up an X2 frequency multiplier. Transformer T2 converts the unbalanced signal from Q6 and Q7 to a balanced signal to drive CR1 and CR2. Varactor diodes CR1 and CR2 have nonlinear capacitive characteristics when biased in the reverse direction. The signal through the secondary of T2 is then distorted with a minimum of power loss resulting in harmonic currents at the tap on T2. The output signal is coupled by C44 to the X3 multiplier. Resistor R23 broadens the frequency response of the circuit to provide the required bandwidth. Resistor R18 provides a d-c path for the generation of a self-bias on CR1 and CR2.

2. Adjustments.

Variable capacitor C44 is adjustable to provide correct impedance matching and coupling between the X2 varactor multiplier and the X3 multiplier.

(g) X3 Multiplier V1. (Refer to figure 22.)

1. Theory.

The signal from the X2 varactor multiplier is applied through a matching network consisting of L18 and C45, to the cathode of V1. The plate circuit of V1 is a cavity resonator with a resonant frequency of three times the input frequency. The capacitance of the cavity is varied by the channel selector to resonate the plate circuit of V1 at the transmit frequency. The capacitance of the cavity is changed in a manner similar to that used in the power amplifiers (see paragraph 3.C.)

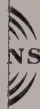
2. Test Points.

Test point J5 permits examination of the drive level into the X3 multiplier.

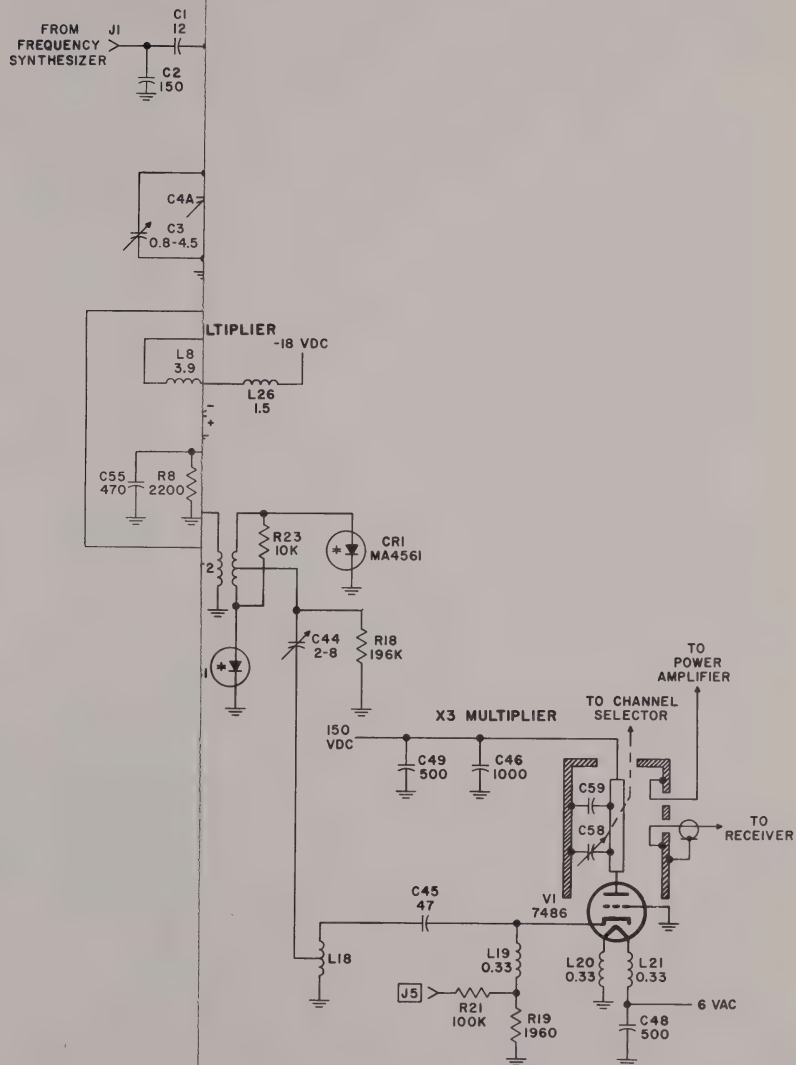
C. Power Amplifier.

(1) Theory.

The power amplifier consists of four plate pulsed amplifiers connected in cascade. The CW signal at the transmit frequency is applied to the first stage. The d-c pulses



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Frequency Multiplier Amplifier (P/O Module
A2A2), Simplified Schematic Diagram
Figure 22



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have a center frequency of approximately 90 mc. The input to Q6 and Q7 is balanced by C36 and C37. The resonant circuit, consisting of C41 and L15 in parallel with primary of T2, forms a band-pass filter centered at approximately 180 mc. The output of T2 is applied to the X2 varactor multiplier.

2. Adjustments and Test Points.

Variable capacitors C36, C37, and C41 are adjusted to obtain maximum power output across the frequency band. Test point J4 permits examination of the signal at 1/12 of the transmit frequency.

(f) X2 Varactor Multiplier. (Refer to figure 22.)

1. Theory.

Varactor diodes CR1 and CR2 and associated circuitry make up an X2 frequency multiplier. Transformer T2 converts the unbalanced signal from Q6 and Q7 to a balanced signal to drive CR1 and CR2. Varactor diodes CR1 and CR2 have nonlinear capacitive characteristics when biased in the reverse direction. The signal through the secondary of T2 is then distorted with a minimum of power loss resulting in harmonic currents at the tap on T2. The output signal is coupled by C44 to the X3 multiplier. Resistor R23 broadens the frequency response of the circuit to provide the required bandwidth. Resistor R18 provides a d-c path for the generation of a self-bias on CR1 and CR2.

2. Adjustments.

Variable capacitor C44 is adjustable to provide correct impedance matching and coupling between the X2 varactor multiplier and the X3 multiplier.

(g) X3 Multiplier V1. (Refer to figure 22.)

1. Theory.

The signal from the X2 varactor multiplier is applied through a matching network consisting of L18 and C45, to the cathode of V1. The plate circuit of V1 is a cavity resonator with a resonant frequency of three times the input frequency. The capacitance of the cavity is varied by the channel selector to resonate the plate circuit of V1 at the transmit frequency. The capacitance of the cavity is changed in a manner similar to that used in the power amplifiers (see paragraph 3.C.)

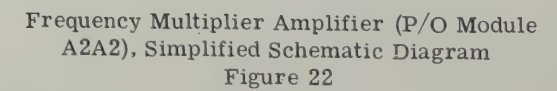
2. Test Points.

Test point J5 permits examination of the drive level into the X3 multiplier.

C. Power Amplifier.

(1) Theory.

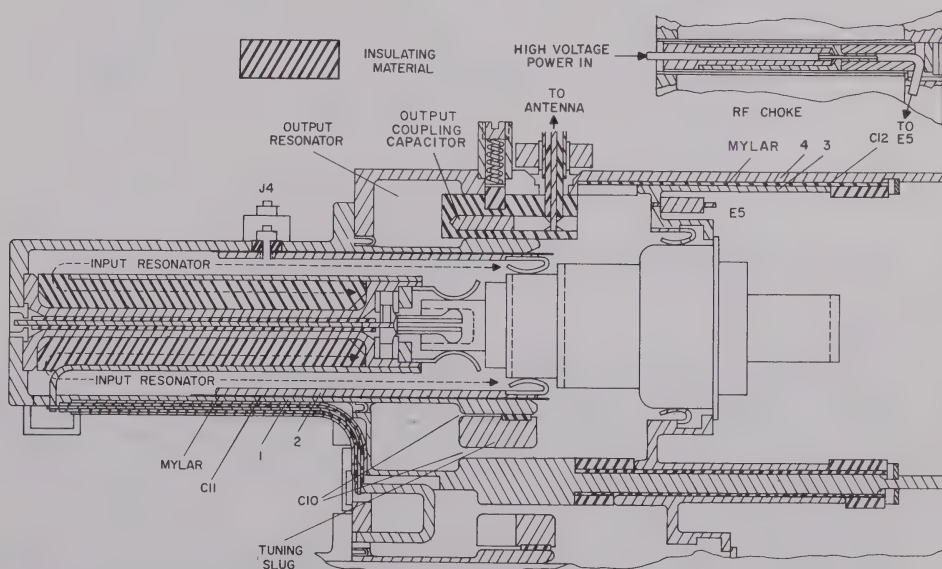
The power amplifier consists of four plate pulsed amplifiers connected in cascade. The CW signal at the transmit frequency is applied to the first stage. The d-c pulses



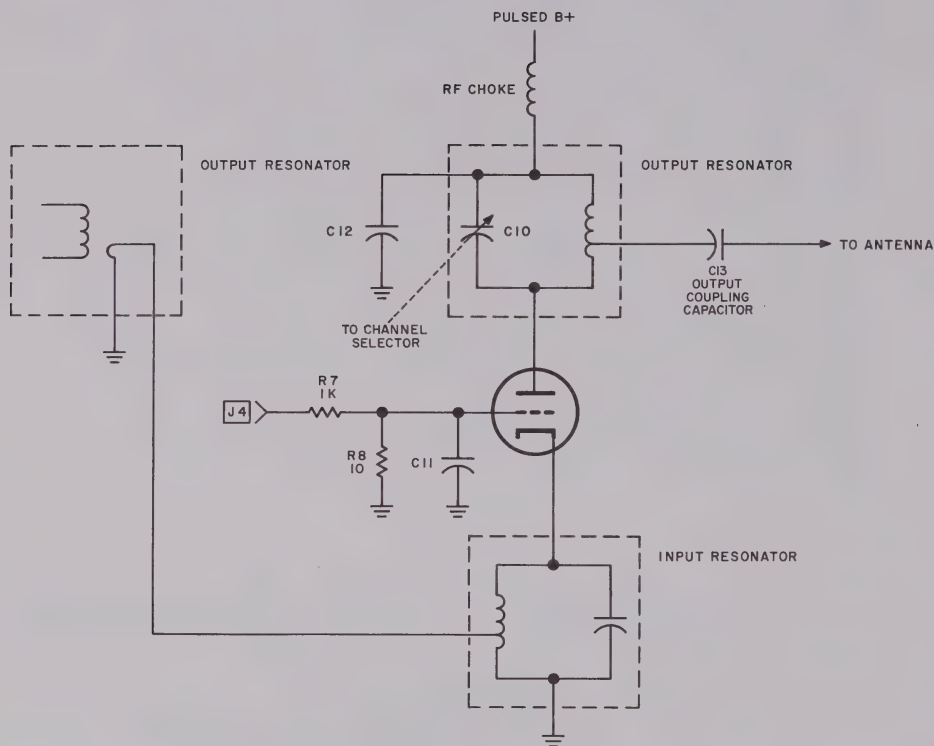


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from the modulator are applied to the plates of the four amplifiers. For the following discussion refer to figures 23 and 24. Figure 24 is a low-frequency equivalent of the final stage of the power amplifier. Figure 23 is a cutaway view of the final amplifier stage. All stages are the same, except in the first stage the grid is d-c grounded and in the first three stages loop output coupling is used. The input to the stage is applied to the input resonator in the cathode circuit. The input circuit is a foreshortened $3/4$ wavelength coaxial resonator. The diode action of the cathode and grid develops the grid bias. Capacitor C11 in the grid circuit consists of two concentric cylinders (1 and 2, figure 23) with Mylar dielectric material between them. In the first stage, the concentric cylinders are screwed together to obtain a d-c short circuit and no grid bias is developed. The output circuit is a foreshortened $1/4$ wave length coaxial resonator. The pulsed plate voltage is applied to the plate through an r-f choke. The choke prevents r-f conduction and radiation. Capacitor C12 consists of two concentric cylinders (3 and 4, figure 23) separated by Mylar dielectric material. Capacitor C10 consists of the capacitance between the tuning slug and the ground plane of the cavity. The resonant frequency of the output resonator is then varied by the axial position of the tuning slug. The tuning slug is driven by the channel selector assembly so that the output circuit is resonant at the transmit frequency on all channels. The output of the first three stages is coupled to the next stage by an inductive loop.



Power Amplifier, Cutaway View
Figure 23



Power Amplifier, Low-Frequency Equivalent Diagram
Figure 24

The output of the fourth stage is coupled by a capacitive probe to the diplexer. The output of the diplexer is applied through a low-pass filter, FL5, to the antenna connector J9. Filter FL5 passes signals in the transmit and receive bands with low loss and low VSWR and provides high attenuation to harmonic frequencies generated by the transmitter. Filter FL1 also provides high attenuation to receive signals above 2000 mc.

(2) Adjustments and Test Points.

The last three stages of the power amplifier have test points J2, J3, and J4 to measure the grid bias voltage that is developed during the transmission of a pulse. By observing the grid bias on any one stage, the input to that stage can be checked. The axial position of the tuning slug at any channel can be varied by the trimmer adjustment (part of the mechanical drive). The axial travel of the tuning slug over the transmit band can be varied by the slope adjustment (part of the mechanical drive).



D. Receiver.

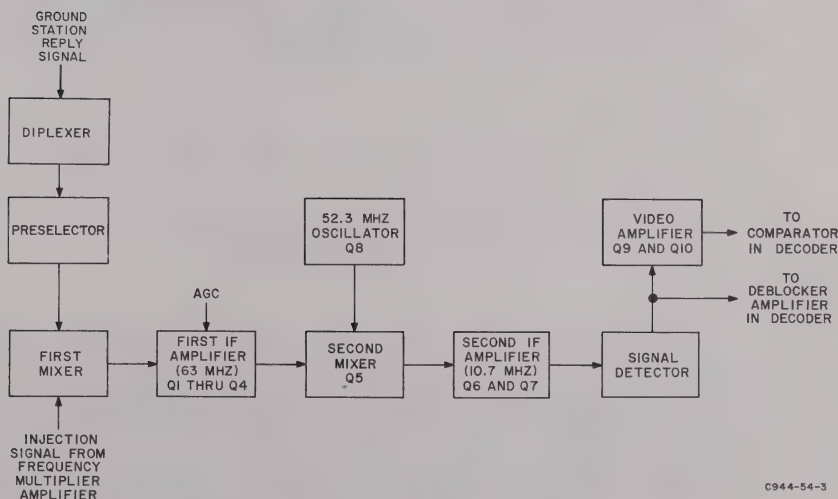
(1) Block Diagram Theory of Operation. (Refer to figure 25.)

The ground station reply signal from the antenna is applied to the first mixer through the diplexer and preselector. The first mixer heterodynes the reply signal and the signal from the frequency multiplier amplifier that is at the transmit frequency. Since the ground station reply frequency and the transmit frequency differ by 63 MHz on all channels, the mixer has an output at 63 MHz. The output of the mixer is amplified by the automatic gain-controlled first if. amplifier, Q1 through Q4, and applied to the second mixer, Q5. The second mixer, Q5, heterodynes the first if. signal and a 52.3-MHz signal from local oscillator Q8 to produce an output at 10.7 MHz. The output of the second mixer, Q5, is amplified by the second if. amplifier, Q6 and Q7, and applied to the signal detector. The signal detector rectifies and filters the if. signal to provide video pulses. The output of the signal detector is applied to the deblocker amplifier in the decoder and through the video amplifier, Q9 and Q10, to the comparator in the decoder.

(2) Detailed Theory of Operation.

(a) Diplexer.

The diplexer utilizes the frequency separation between the transmit and receive frequency to provide isolation between the transmitter and receiver. The diplexer is essentially a T connection of two one-quarter wave length coaxial lines with the



Receiver, Block Diagram
Figure 25



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antenna connected to the common point. The coaxial connector between the transmitter and the antenna presents a high impedance at receive frequencies and the coaxial connector between the antenna and the receiver presents a high impedance at transmit frequencies.

(b) Preselector.

1. Theory.

The signal received by the antenna is applied to the preselector. The preselector consists of three Autopositioner-tuned cavities coupled in cascade. The preselector provides image rejection and protects mixer crystal CR1 from being damaged by the transmitter output. The output of the preselector is applied to the first mixer.

2. Adjustments.

Tuning slugs Z1, Z2, and Z3 in the preselector are adjusted to resonate at the receive frequency. A description of the tuning process and location of the adjustment points is given in the testing section of this manual.

(c) First Mixer. (Refer to figure 26.)

1. Theory.

The preselector output and the injection signal from the frequency multiplier amplifier are applied to the cathode of crystal mixer CR1. The mixed signals at the anode of CR1 are applied through Z4 to the first i-f amplifier. Z4 is a 1000-mc filter to prevent injection signals from being applied to the i-f amplifier.

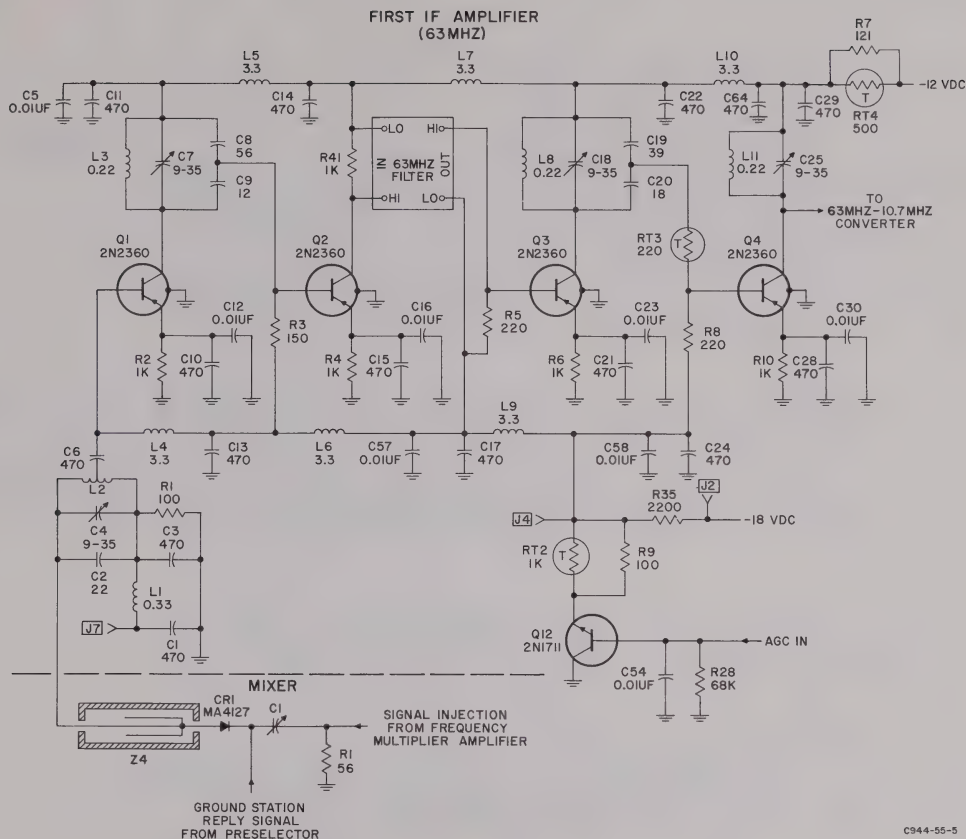
2. Adjustments.

Capacitor C1 is adjusted to obtain the proper amount of crystal current. For a description of the adjustment of C1, see the testing section of this manual.

(d) First I-F Amplifier Q1, Q2, Q3, and Q4. (Refer to figure 26.)

1. Theory.

The mixed signal from the mixer is applied through a 63-mc single tuned autotransformer L2, C2, and C4, to Q1, the first stage of the four-stage, first i-f amplifier. Transistor Q1 has a single-tuned circuit in the collector tuned to 63 mc. The output from Q1, taken from the matching network C8 and C9, is amplified by Q2 and applied to a 63-mc filter. The 63-mc filter is a band-pass filter to provide image rejection for the second i-f amplifier. The output of the 63-mc filter is applied to Q3. Transistor Q3 has a single-tuned circuit in the collector tuned to 63 mc. The output of Q3, taken from the matching network C19 and C20, is applied to Q4. Transistor Q4 has a single-tuned circuit in the collector tuned to 63 mc. The output of Q4 is applied to the second mixer. The agc voltage is applied to the base of transistor Q12. The agc voltage, approximately -4 volts when there is no received signal, goes more



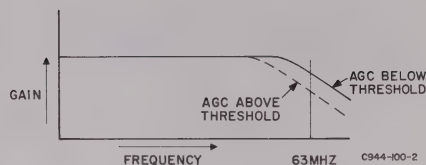
**Mixer and First IF. Amplifier (P/O Modules A2A5 and A2A6),
Simplified Schematic Diagram
Figure 26**

negative when the amplitude of the received signal increases. This change in the control voltage tends to cut off Q12, thus causing the voltage at the junction of R35 and R9 to go more negative. The change in voltage at the junction of R35 and R9 is applied to the bases of Q1 through Q4. The emitter-to-collector voltage then decreases causing frequency response to decrease. The gain of the transistors at 63 MHz is then reduced (see figure 27).

2. Adjustments and Test Points.

Test point J7 is used to measure the injection level into the first mixer, CR1. Test point J4 is used to measure the agc level applied to the first if. amplifier.

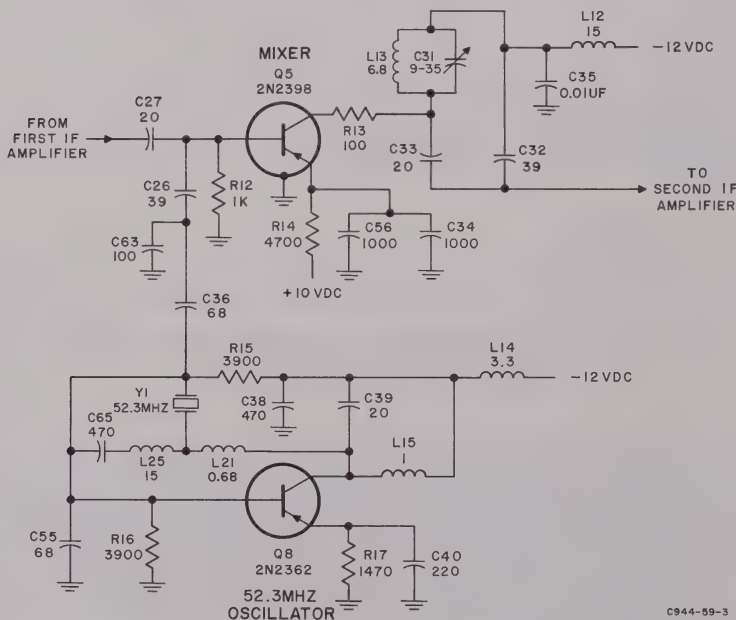
Test point J2 is used to check the -18-volt supply. Variable capacitor C4 is adjusted to obtain minimum noise and maximum signal output at 63 MHz. Variable capacitors C7, C18, and C25 are adjusted to obtain maximum signal output at 63 MHz.



Frequency Response of First
IF Transistors
Figure 27

- (e) 52.3-MHz Oscillator Q8. (Refer to figure 28.)

Transistor Q8 is a crystal controlled, 52.3-MHz oscillator with selective feedback from collector to base through L21 and Y1. The tuned circuit consisting of L15 and C39 is capacitive at the oscillator frequency. This capacitance, with inductor L21 and the input capacitance at the base of Q8, forms a pi matching network to match the collector impedance to the base impedance. The output of Q8, taken at the base, is applied to the second mixer through C36.



63-MHz to 10.7-MHz Converter (P/O Module A2A6),
Simplified Schematic Diagram
Figure 28



(f) Second Mixer Q5. (Refer to figure 28.)

1. Theory.

The 52.3-mc signal from oscillator Q8 and the 63-mc first i-f signal are applied to the base of Q5. Capacitors C27, C26, and C63 in series form a matching network to match Q4 to Q5. The 52.3-mc injection signal is applied at the junction of C26 and C63. The signals are mixed in Q5 and the difference frequency, 10.7 mc, is developed across the collector tank circuit consisting of L13 and C31. The output, taken from the tuned collector circuit, is applied to the second i-f amplifier through an impedance matching network consisting of C32 and C33.

2. Adjustments.

Variable capacitor C31 is adjusted to obtain maximum output from the second mixer, Q5.

(g) Second I-F Amplifier Q6 and Q7. (Refer to figure 29.)

1. Theory.

The output of mixer Q5 is applied to the base of transistor amplifier Q6. The collector circuit of Q6 is tuned to 10.7 mc. The output of Q6 is applied through a T-pad to the 10.7-mc narrow-band filter. The output of the 10.7-mc filter is applied through a T-pad to Q7.

The T-pad attenuators isolate the input and output of the filter and provide the proper impedance match over the range of input signal level. The 10.7-mc filter provides the receiver selectivity. Transistor Q7 has a single tuned circuit in the collector circuit tuned to 10.7 mc. The output of Q7 is applied to the signal detector.

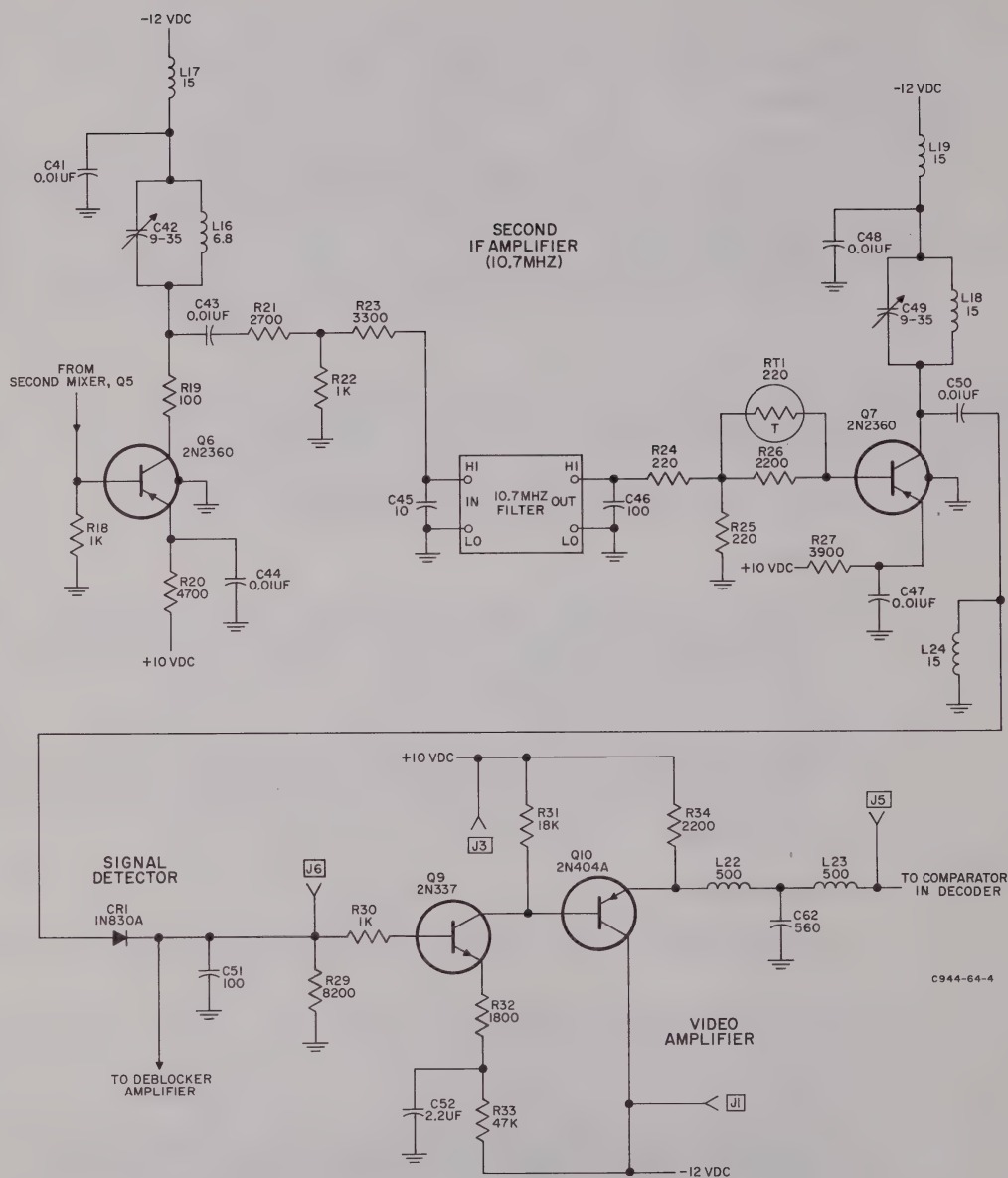
2. Adjustments.

Variable capacitors C42 and C49 are adjusted to obtain maximum response at 10.7 mc.

(h) Signal Detector. (Refer to figure 29.)

1. Theory.

Diode CR1, capacitor C51, and resistor R29 make up the signal detector. Diode CR1 allows only the positive half cycles of the second i-f signal to charge capacitor C51. The time constant of C51 and R29 (less than 1 usec) is such that C51 does not discharge between half cycles but does discharge shortly after a received r-f pulse. The voltage at the junction of C51 and R29 is therefore a video pulse for every received r-f pulse. The output of the detector is applied to the video amplifier and to the deblocker circuits in the decoder.



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2. Test Points.

Test point J6 permits inspection of the amplitude and shape of detected video pulses.

(i) Video Amplifier Q9 and Q10. (Refer to figure 29.)

1. Theory.

The video pulses from the signal detector are applied to Q9. Transistor Q9 is a common-emitter video amplifier with a voltage gain of approximately nine. The output of Q9 is applied to emitter follower Q10. The output of Q10 is applied through a delay line, consisting of L22, C62 and L23, to the decoder. This added delay makes the total delay through the video amplifier the same as that through the deblocker amplifier. See paragraphs 6.E.(1) and 6.E.(2)(1) for a discussion of the deblocker circuits.

2. Test Points.

Test point J1 permits measurement of the -12-volt supply. Test point J3 permits measurement of the +10-volt supply. Test point J5 permits inspection of the output of the video amplifier.

E. Distance Decoder.

(1) Block Diagram Theory of Operation. (Refer to figure 30.)

The detected video pulses from the receiver are applied to emitter follower Q1. The output of the emitter follower is applied to the bearing and agc circuits and to comparator CR5, Q2. The output of the comparator, a pulse of fixed amplitude for every input pulse large enough to fire tunnel diode CR5, is applied to amplifier Q4. The output of the comparator is suppressed when a suppressor pulse is applied to suppression amplifier Q3. This prevents the agc circuits from reacting to properly coded, local pulses having a high prf. The output of amplifier Q4 is applied to pulse-shaping multivibrator Q5 and Q6. The output of pulse-shaping multivibrator is applied through emitter follower Q7 to 9.8-usec delay line and through differentiator C10 and an OR-circuit to the coincidence circuit. The output of the 9.8-usec delay line is applied to comparator CR16, Q12 and through emitter follower Q13 to 18-usec delay line. The output of 18-usec delay line is applied to comparator CR13, Q10. The comparators, at the outputs of delay lines, square the delayed outputs and the resulting pulse width is 4 usec. The comparator outputs are applied to time delay selector Q11 and Q9. The time-delay selector applies either 9.8-usec delayed pulse or the 27.8-usec delayed pulse to the coincidence circuit depending on channel. The 9.8-usec delay is selected if the 860E-2 is tuned to an X channel, and the 27.8-usec delay is selected if the 860E-2 is tuned to a Y channel. The coincidence circuit compares the delayed pulses with the nondelayed pulses from the OR-circuit. If the received pulses are properly spaced, 12 usec on X channels, 30 usec on Y channels, the second pulse of a nondelayed pulse pair will be applied to the coincidence circuit at the same time the first pulse of the delayed pulse pair is applied to the coincidence circuit. The output of the coincidence circuit, a pulse when delayed and nondelayed pulses are time coincident, is amplified by Q15 and triggers the reply multivibrator



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Q16 and Q17. The output of the reply multivibrator is applied to the bearing and agc circuits, and through emitter follower Q18 to the computing circuits, the identification circuits, and the signal controlled search circuits.

In the event that the amplitude of the reply signals to the 860E-2 are instantaneously high, the agc circuits may not have time to react. This could happen if the 860E-2 is channeled to a station near the aircraft. If the receiver is in saturation because of lack of agc, the leading edge of the second pulse of a pulse pair may not be well enough defined to trigger the first comparator (CR5, Q2). The pulse-shaping multivibrator will then be triggered by only the first pulse of a pulse pair, and a second nondelayed pulse from the pulse-shaping multivibrator will not be applied to the coincidence circuit to permit decoding. A second nondelayed pulse is applied to the coincidence circuit in this case through the deblocker amplifier, differentiators, amplifier, and OR-circuit from the signal detector. This permits decoding and allows the agc to build up to the point where the decoder operates in the normal manner.

(2) Detailed Theory of Operation.

(a) Emitter Follower Q1. (Refer to figure 31.)

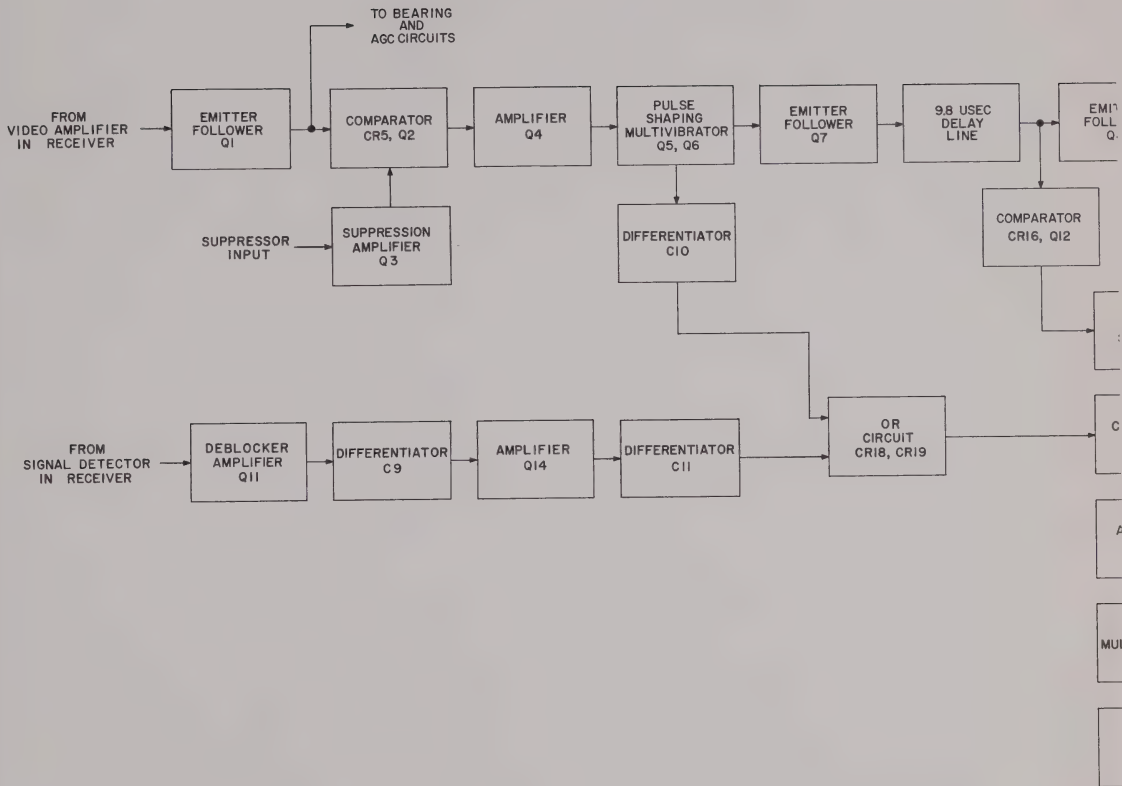
The video pulses from the video amplifier are applied to the base of emitter follower Q1. The emitter follower prevents the decoding circuits from loading the video amplifier. The output of Q1 is applied to the comparator and the bearing and agc circuits.

(b) Comparator CR5 and Q2. (Refer to figure 31.)

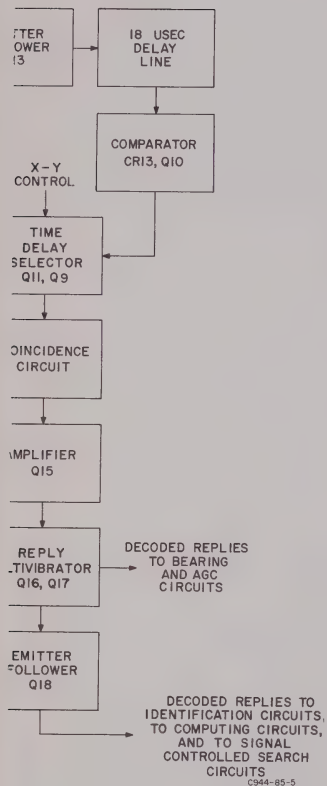
The negative pulses from Q1 are applied through C2 to the junction of CR4 and R4. The pulse voltage is developed across R4 until peak current is reached through tunnel diode CR5. When peak current is reached through CR5, the voltage developed across CR5 switches to a higher value and is applied to the base of Q2. At the trailing edge of the pulse, when valley current is reached through CR5, the voltage across CR5 switches from the higher value to nearly zero. The signal applied to Q2 is then a negative pulse with a fast rise and fall time, if the pulse at the junction of CR4 and R4 is large enough to fire CR5. Before CR5 fires, transistor Q2 is off and the voltage at the junction of R5 and R6 is approximately -5 volts. When CR5 fires, transistor Q2 is turned on and the voltage at the junction of R5 and R6 goes in a positive direction. This change in voltage is applied to the base of amplifier Q4 as a positive-going pulse.

(c) Suppressor Amplifier Q3. (Refer to figure 31.)

Suppressor amplifier Q3 shunts load resistor R5 of the comparator. When there is no input to Q3 (Q3 off), the voltage at the junction of R5 and R6 is as described in paragraph 6.E.(2)(b). When a suppressor pulse (positive pulse) is applied to Q3, it is turned on and the collector (junction of R5 and R6) is held at -5 volts preventing the application of any pulses to Q4.

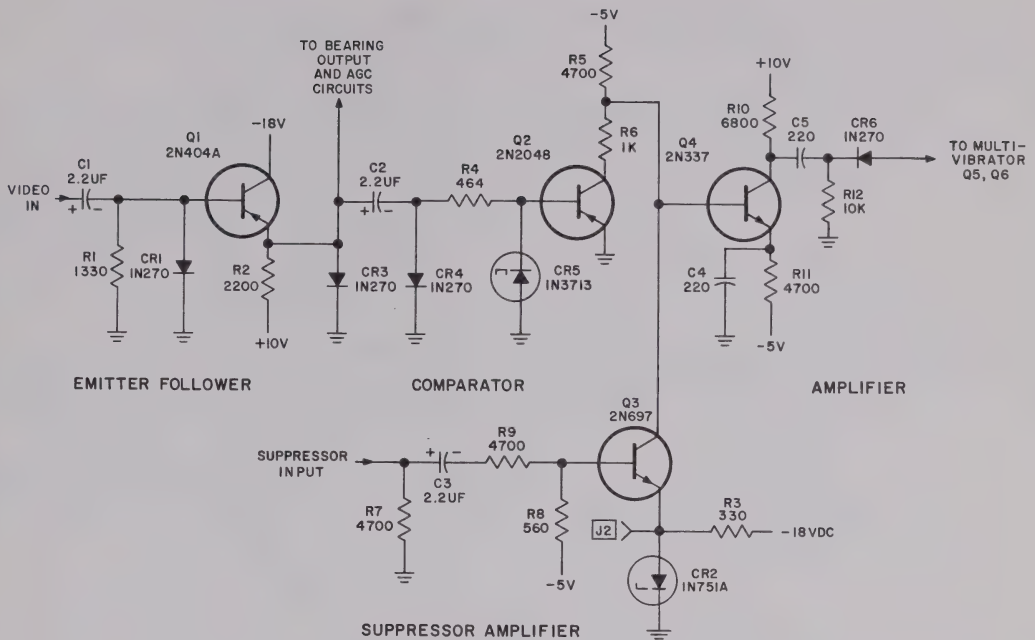


Distance Decoding Circuits, Block Diagram
Figure 30





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Suppression Circuits (P/O Module A3), Simplified Schematic Diagram
Figure 31

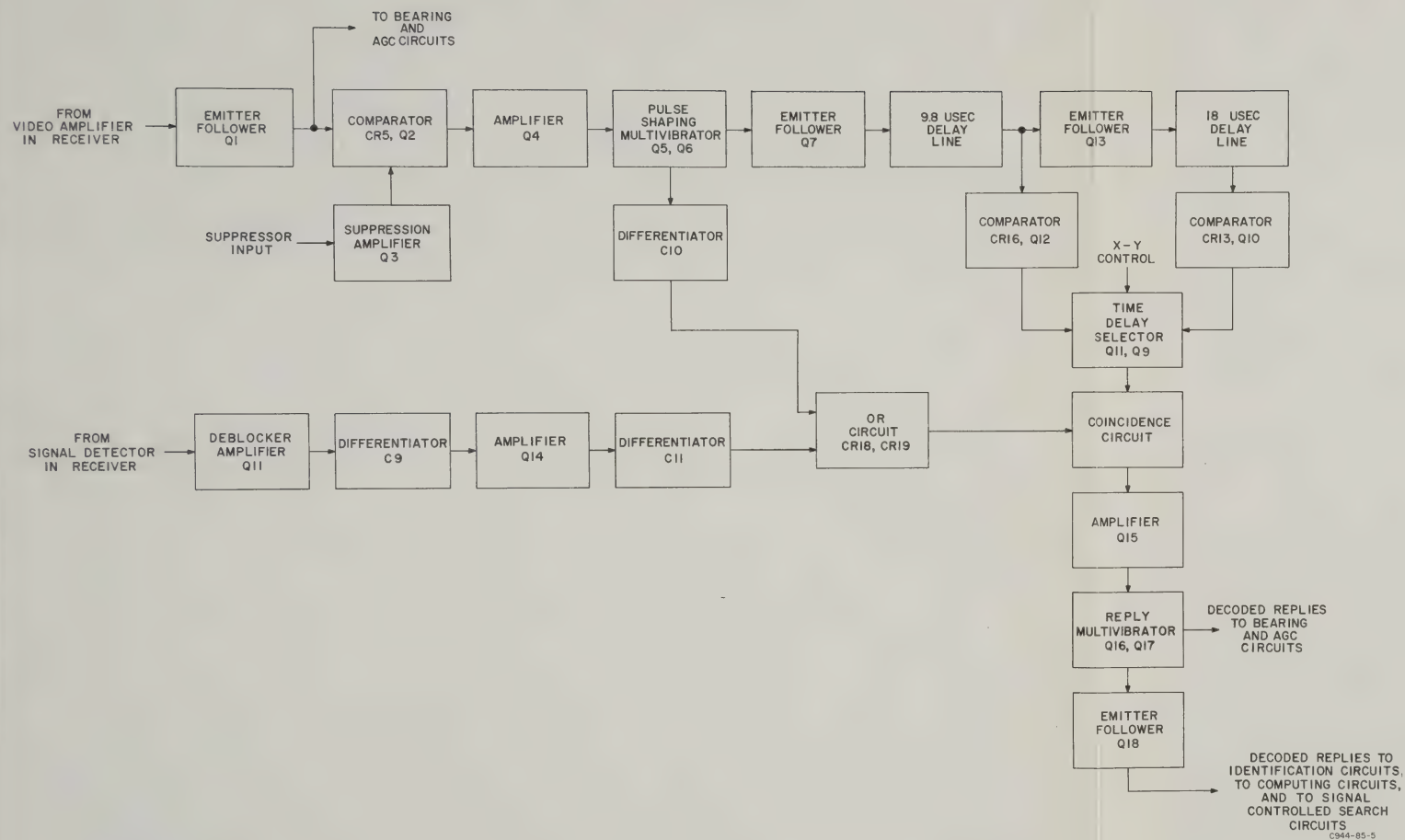
(d) Amplifier Q4. (Refer to figure 31.)

1. Theory.

Transistor Q4 is off (base at -5 volts) when there is no pulse applied to it. When Q4 is off, the collector is at approximately +10 volts. When a positive pulse is applied to the base of Q4, it is turned on and the collector potential drops from +10 volts. This negative pulse is differentiated by C5 and R12 to produce a negative spike at the leading edge of the pulse and a positive spike at the trailing edge of the pulse. Diode CR6 allows only the negative spike to pass. This negative spike is time coincident with the half-voltage point on the leading edge of a received pulse. The negative spike is applied to the pulse-shaping multivibrator Q5 and Q6.

2. Test Points.

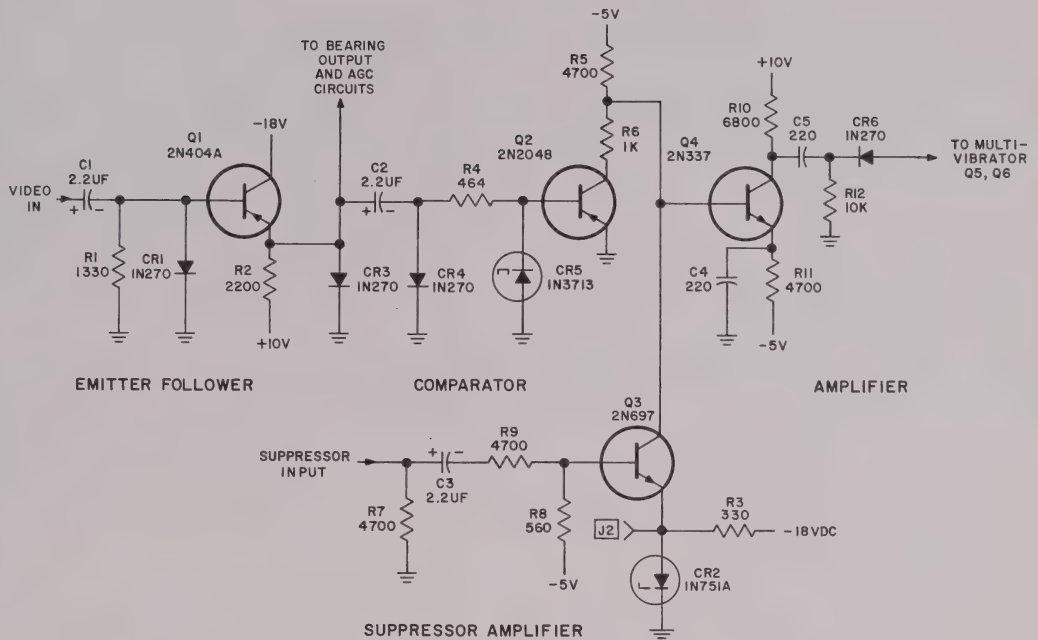
Test point J2 permits measurement of the -5-volt power supply.



Distance Decoding Circuits, Block Diagram
Figure 30



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Suppression Circuits (P/O Module A3), Simplified Schematic Diagram
Figure 31

(d) Amplifier Q4. (Refer to figure 31.)

1. Theory.

Transistor Q4 is off (base at -5 volts) when there is no pulse applied to it. When Q4 is off, the collector is at approximately +10 volts. When a positive pulse is applied to the base of Q4, it is turned on and the collector potential drops from +10 volts. This negative pulse is differentiated by C5 and R12 to produce a negative spike at the leading edge of the pulse and a positive spike at the trailing edge of the pulse. Diode CR6 allows only the negative spike to pass. This negative spike is time coincident with the half-voltage point on the leading edge of a received pulse. The negative spike is applied to the pulse-shaping multivibrator Q5 and Q6.

2. Test Points.

Test point J2 permits measurement of the -5-volt power supply.

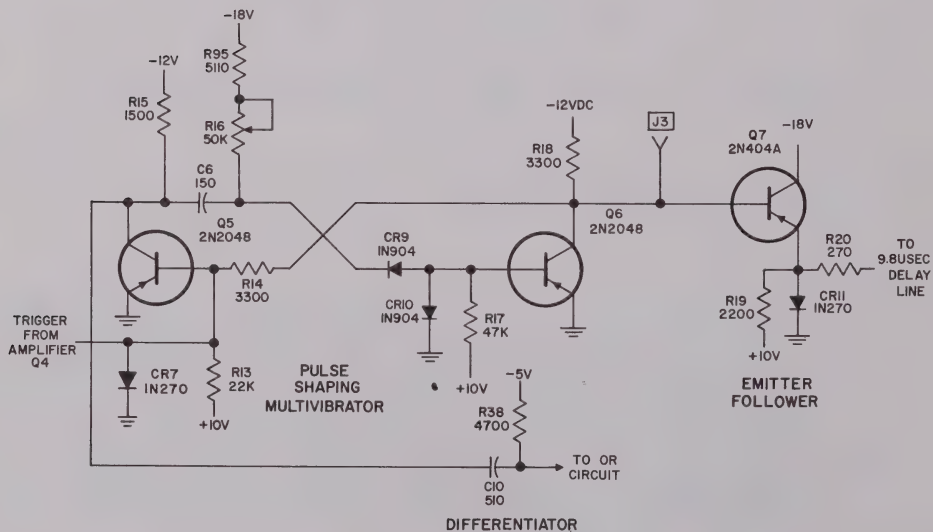


(e) Pulse-Shaping Multivibrator Q5 and Q6. (Refer to figure 32.)

1. Theory.

Transistors Q5 and Q6 operate as the pulse-shaping multivibrator. When there is no input signal, Q5 is reverse biased (cut off) and Q6 is forward biased (saturated). The network consisting of CR9, R16 and R95 places a negative potential on the base of Q6 driving it to saturation. With Q6 in saturation, the collector potential is approximately at ground. When Q6 is saturated, the voltage divider network of R13 and R14, between +10 volts and the collector potential, applies a positive potential to the base of Q5, limited by CR7, to reverse bias Q5. The potential at the collector of Q5, when Q5 is reverse biased, is approximately -12 volts.

When the negative trigger from Q4 is applied to the base of Q5, transistor Q5 is forward biased and the potential at the collector of Q5 moves toward ground from -12 volts. This positive pulse is coupled through C6 to the cathode of CR9. Diode CR9 is then cut off. A small positive potential at the base of Q6 is obtained because of R17 and CR10. This voltage reverse biases Q6 causing the collector potential of Q6 to move from ground to -12 volts. This negative potential at the collector of Q6 causes the voltage at the junction of R13 and R14 (base of Q5) to go negative to saturate Q5.



Pulse-Shaping Multivibrator (P/O Module A3), Simplified Schematic Diagram
Figure 32



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The time that Q6 remains cut off is determined by the time constant of C6, R95 and R16. When C6 discharges enough to produce a forward bias on CR9, the voltage at the base of Q6 goes negative and Q6 is forward biased. The multivibrator then returns to its original state. The negative pulse from the collector of Q6 is applied to the base of emitter follower Q7. The positive pulse, taken at the collector of Q5, is differentiated by C10 and R38 to produce a positive spike that is applied to an OR-circuit.

2. Test Points and Adjustments.

Test point J3 permits inspection of the shape of the output pulse of the multivibrator. Variable resistor R16 is adjusted to make the output pulse of the multivibrator the correct width so that the output pulse from the comparator at J4 is 4 usec wide. This adjustment determines the decoder selectivity of the receiver by controlling the width of the delayed pulse that is compared with the nondelayed pulse in the coincidence circuit.

(f) Emitter Follower Q7. (Refer to figure 32.)

The negative pulse from the collector of Q6 is applied to Q7. The output from Q7 is applied to the 9.8-usec delay line. The emitter follower isolates the delay line from the pulse-shaping multivibrator.

(g) 9.8-UseC Delay Line and Comparator. (Refer to figure 33.)

The output of the pulse-shaping multivibrator is coupled through the 9.8-usec delay line and emitter follower Q13 and developed across R32 and CR16. The pulse voltage is developed across R32 until peak current is reached through CR16. When peak current is reached, the voltage across tunnel diode CR16 switches to a larger value. At the trailing edge of the pulse, when valley current is reached through CR5, the voltage across CR5 switches from the higher value to nearly zero. The square negative voltage pulse across CR16 is applied to the base of transistor Q12. Emitter follower Q13 isolates the 18-usec delay line from the 9.8-usec delay line.

(h) 18-UseC Delay Line and Comparator. (Refer to figure 33.)

The output of emitter follower Q13 is applied through the 18-usec delay line and developed across R26 and CR13. Resistor R26 and CR13 square the pulse in the same manner as R32 and CR16 described in paragraph 6.E.(2)(g) above. The square negative voltage pulse across CR13 is applied to Q10.

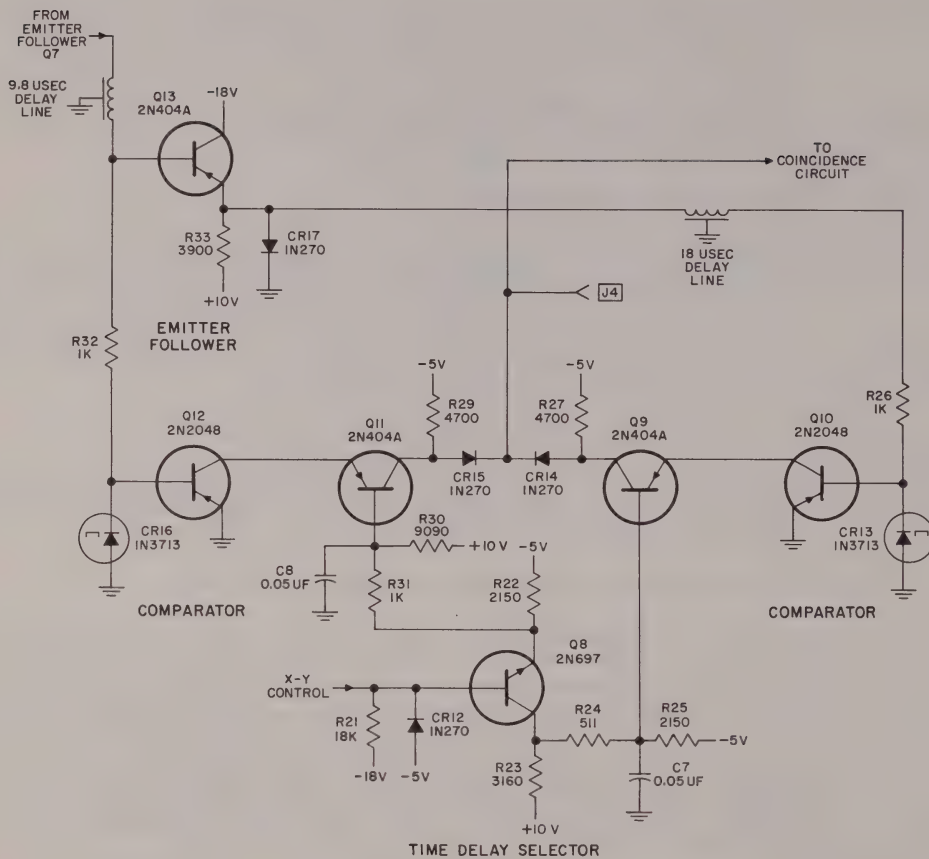
(i) Time Delay Selector. (Refer to figure 33.)

1. Theory.

X-Y channel information is applied to the base of transistor Q8. When the 860E-2 is tuned to a Y channel, the X-Y control wire is at ground. When the base of transistor Q8 is at ground, Q8 is forward biased. When the 860E-2 is tuned to an X channel, the X-Y control wire is not grounded. The base of



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Time Delay Circuits (P/O Module A3), Simplified Schematic Diagram
Figure 33

transistor Q8 is at approximately -5.5 volts when the X-Y control is not grounded because of CR12 and R21. When the base of transistor Q8 is at -5.5 volts, Q8 is cut off.

When the base of Q8 is at ground potential (Y channel), the voltage at the base of Q11 is approximately +1 volt and the voltage at the base of Q9 is approximately -1 volt. When the base of Q8 is at -5.5 volts (X channel), the voltage at the base of Q11 is approximately -1 volt and the voltage at the base of Q9 is approximately +0.5 volt.



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When the base of Q11 is at -1 volt (X channel), Q11 is forward biased. This completes a conduction path from -5 volts at R29 through Q11 to ground when the negative pulse is applied to the base of Q12. The voltage at the anode of CR15 then changes from -5 volts to approximately 0 volt when a negative pulse is applied to Q12. When the base of Q11 is at +1 volt, (Y channel), Q11 is cut off. This prevents a pulse applied to Q12 from affecting the voltage at the anode of CR15.

The operation of Q9 and Q10 is the same as that described for Q11 and Q12 except that pulses applied to Q10 are applied to CR14 when the 860E-2 is tuned to Y channels.

2. Test Points.

Test point J4 permits inspection of the output pulses from the time delay selector.

(j) Coincidence Circuit. (Refer to figure 34.)

1. Theory.

The 4-usec wide positive delayed pulse from the time delay selector circuits is applied to the anodes of CR20 and CR22. The nondelayed differentiated positive pulses from the pulse-shaping multivibrator and the deblocker circuits are applied to the anodes of CR19 and CR18.

When neither the delayed nor nondelayed pulses are applied to the coincidence circuit, diodes CR20 and CR22 are zero biased since the cathodes and anodes of both diodes are returned to -5 volts. When the positive delayed pulse is applied to the coincidence circuit, diode CR20 is forward biased. Diode CR22 is not forward biased because of the small voltage drop across CR20 and the low impedance of resistor R39 and L2. If a nondelayed pulse is applied through either CR18 or CR19 when the delayed pulse is applied, diode CR20 is reverse biased. With diode CR20 reverse biased, the positive delayed pulse voltage is dropped across R28, CR22, and R40. The voltage at the base of Q15 then goes from -5 volts to a more positive value for the time of the nondelayed pulse. This change in voltage at the base of Q15 forward biases Q15. During the period Q15 conducts, the collector of Q15 goes from ground to a negative voltage. This negative pulse is applied through CR23 to trigger the reply multivibrator.

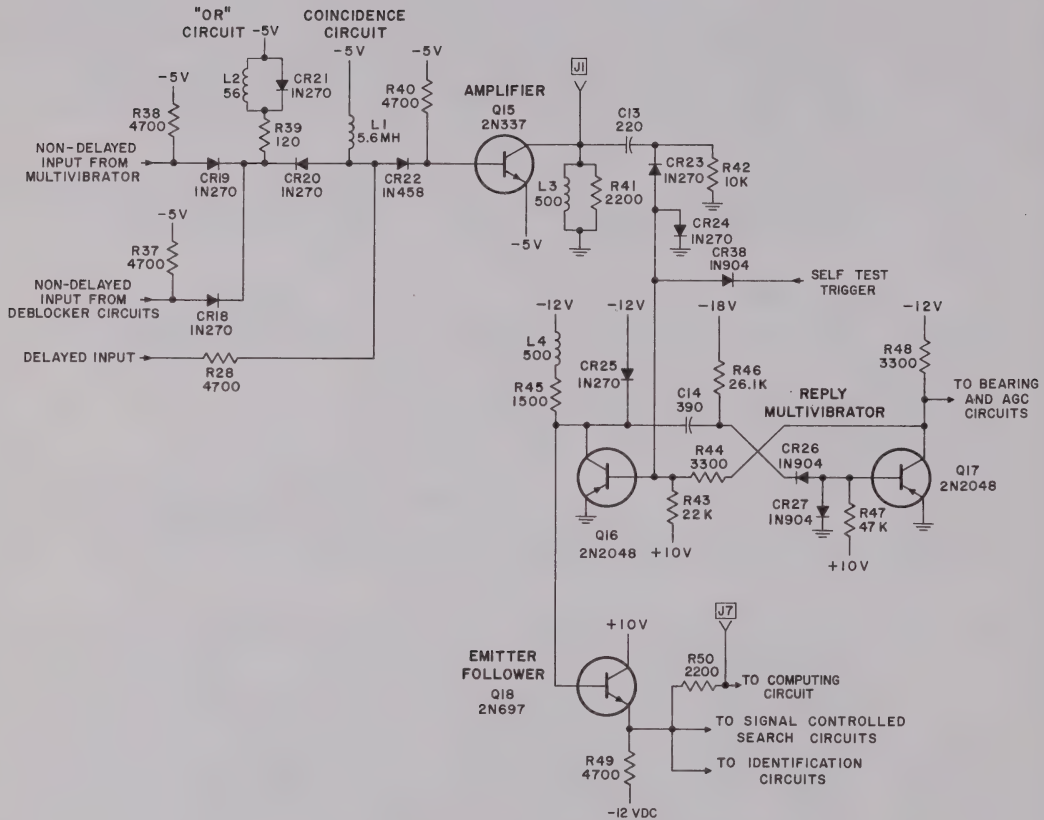
2. Test Points.

Test point J1 permits inspection of the output pulses from the coincidence circuit.

(k) Reply Multivibrator Q16 and Q17. (Refer to figure 34.)

1. Theory.

Transistors Q16 and Q17 operate together to form a one-shot multivibrator. When no trigger is applied to the reply multivibrator, the network consisting of



Reply Multivibrator Circuits (P/O Module A3), Simplified Schematic Diagram
Figure 34

CR26 and R46 causes Q17 to be in saturation. With Q17 in saturation, the collector of Q17 is approximately at ground. The voltage divider network between +10 volts and the collector of Q17 consisting of R43 and R44 applies a positive voltage, limited by CR24, to the base of Q16 when Q17 is saturated. This positive potential back biases Q16. The collector potential of Q16 is -12 volts when Q16 is cut off. When the negative trigger from Q15 through CR23, or the negative self-test trigger through CR38, is applied to the base of Q16, Q16 is forward biased. This causes the voltage at the collector of Q16 to move from -12 volts toward ground. This change in voltage is coupled through C14 to the cathode of CR26. Diode CR26 is then back biased and Q17 is cut off by the positive voltage across CR27 supplied through R47. The voltage at the collector



of Q17 moves from ground to -12 driving Q16 into saturation. After capacitor C14 discharges through R46 the multivibrator returns to its original state.

The negative pulse at the collector of Q17 is applied to the bearing output and age circuits. The positive pulse from the collector of Q16 is applied through emitter follower Q18 to the computing circuits, the signal controlled search circuits, and the tone identification circuits.

2. Test Points.

Test point J7 permits inspection of the output pulse of the reply multivibrator.

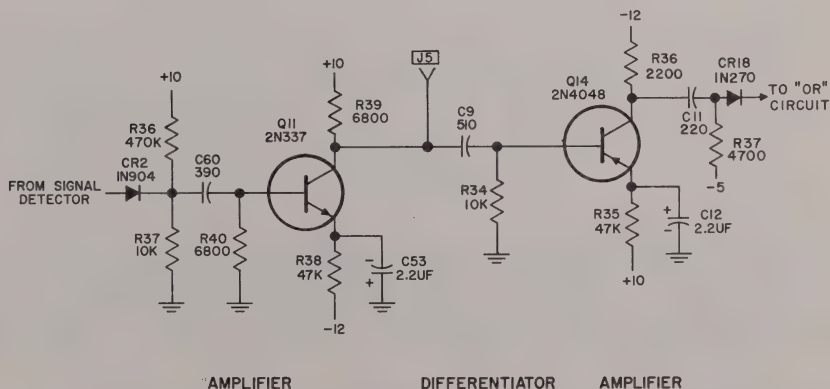
(l) Deblocker Circuits. (Refer to figure 35.)

1. Theory.

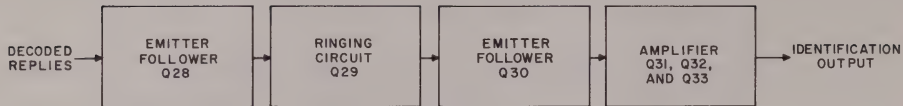
The output from the signal detector in the receiver is applied to the anode of diode CR2. The cathode of CR2, under no-signal conditions is at approximately +0.2 volts. The output pulses of the signal detector, under normal conditions, are not large enough to forward bias CR2 and be coupled to Q11. Under special conditions, when the age does not react properly, the output of the signal detector is large enough to forward bias CR2 and be applied to amplifier Q11. The output of amplifier Q11 is differentiated by C9 and R34 and applied to amplifier Q14. The output of Q14 is differentiated by C11 and R37 and applied through the OR diode, CR18, to the coincidence circuit.

2. Test Points.

Test point J5 permits inspection of the deblocker output pulse.



Deblocker Circuits (P/O Modules A2A6 and A3), Simplified Schematic Diagram
Figure 35



Identification Circuits, Block Diagram
Figure 36

F. Identification Circuits.

(1) Block Diagram Theory of Operation. (Refer to figure 36.)

The decoded replies into the identification circuits occur at the same time as the second pulses of properly spaced pulse pairs. These are randomly spaced squitter, azimuth reference bursts, and distance reply pulses or an identification signal. The identification signal is 100-usec spaced pulse pairs (identification pulse and equalizer pulse) at a prf of 1350 pps or single pulses (no equalizer) at a prf of 1350 pps.

The decoded replies are applied through emitter follower Q28 to the ringing circuit. The ringing circuit has a tone output if the input pulses are spaced 741 usec apart (1350 pps). The output of the ringing circuit is applied through emitter follower Q30 to amplifier Q31, Q32, and Q33. The amplified tone is applied to the audio identification tone output pins of the rear connector.

(2) Detailed Theory of Operation.

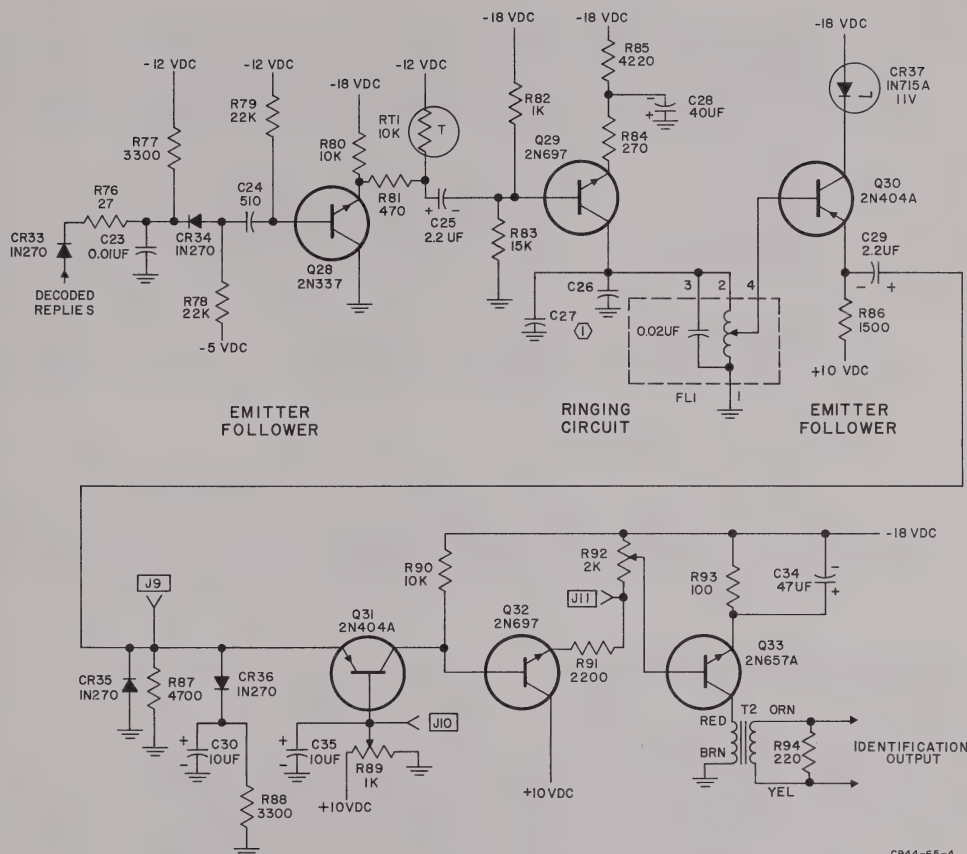
(a) Emitter Follower Q28. (Refer to figure 37.)

The decoded replies are applied to a burst eliminator consisting of CR33, R76, C23, R77, CR34, and R78. When there are no decoded replies applied to the circuit, diode CR34 is forward biased and the voltage at the anode of CR34 is approximately -11 volts. When a positive pulse (decoded reply) is applied to CR33, C23 is charged rapidly through R76. The positive charge on C23 back biases CR34. The voltage at the anode of CR34 moves from -11 volts to -5 volts. This change in voltage is differentiated by C24 and R79 and applied to Q28 as a positive spike.

Capacitor C23 discharges at a slow rate (time constant of 33 usec) through R77. If the decoded replies occur closely spaced, diode CR34 is back biased by the first pulse. This eliminates the application of many pulses to Q28 during a north reference burst or an auxiliary burst. The time constant of C23 and R77 is fast enough to allow pulses spaced 100 usec to pass to Q28. The output of emitter follower Q28 is applied to the ringing circuit.

(b) Ringing Circuit. (Refer to figure 37.)

The positive pulses from Q28 are coupled through C25 to the base of Q29. The pulses cause the tuned collector circuit to oscillate at 1350 cps. If the pulses are



NOTE:

- ① C26 AND C27 SELECTED TO RESONATE AT 1350HZ. RANGE OF CAPACITANCE FROM 250 TO 1020 PICOFARADS.

AMPLIFIER

C944-65-4

Identification Circuits (P/O module A3), Simplified Schematic Diagram
Figure 37

applied to Q29 at a rate of 1350pps, the oscillations are sustained for the duration of the pulses. If the pulses are not properly spaced, the oscillations die out.

(c) Emitter Follower Q30 and Amplifier Q31, Q32, and Q33. (Refer to figure 37.)

1. Theory.

The output of the ringing circuit is applied to the base of emitter follower Q30. Diode CR35, a d-c restorer, clamps the most negative portion of the sine wave to



approximately ground. The sine wave, totally positive with respect to ground, is applied to the emitter of Q31 that is shunted by CR36, C30, and R88. Reverse bias is applied to the base of Q31 by R89. Transistor Q31 is reverse biased and prevents an identification tone output except when C30 is charged enough to forward bias Q31.

If the signal, applied to the emitter of Q31 is a large burst from the ringing circuit caused by squitter pulses, it is limited by CR36 and C30 since C30 is not completely charged prior to the burst. Noise output between tone signals is then eliminated. If the signal is a result of identification pulses being applied to Q29, the ringing circuit provides a steady signal. Capacitor C30 is charged at the beginning of the identification tone. A minimum of shunting by C30 results and an output is obtained from Q31. The output of Q31 is applied to emitter follower Q32. The output of Q32 is amplified by Q33 and coupled to the output jacks through isolation transformer T2.

2. Adjustments and Test Points.

Variable resistor R89 is used to adjust the reverse bias on Q31 so that only valid identification pulses produce an output. Variable resistor R92 is used to adjust the audio output level. Test point J10 allows measurement of the bias on Q31. Test points J11 and J9 allow observation of the identification signal in the amplifier.

G. Bearing Output and AGC Circuits.

(1) Block Diagram Theory of Operation. (Refer to figure 38.)

The amplitude information of the received pulses is not present in the decoded replies because the decoding is active. The received signal prior to decoding does contain amplitude information necessary to operate the agc circuits and to drive an external azimuth unit. The decoded signal and signal containing amplitude information are applied to an AND-circuit. The amplitude of the decoded signal is always larger than the peak value if the signal containing amplitude information and the output of AND-circuit is equal to the smaller of two time coincident inputs. The output of the AND-circuit is therefore a decoded signal having received amplitude information. The output of the AND-circuit is applied through amplifier Q19 and emitter follower Q20 to the RCVR OUT jack on the front panel. Emitter follower Q20 also drives amplifier Q21 and Q22. The output of amplifier Q21 and Q22 is integrated and applied to the agc circuits. The d-c output of the agc circuits is amplified and applied to the first i-f amplifier.

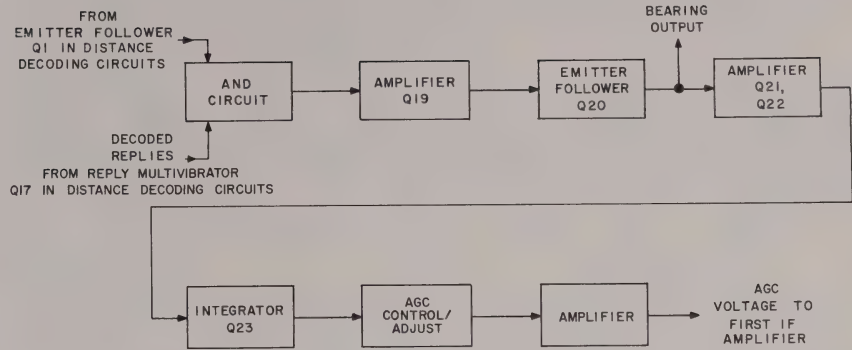
(2) Detailed Theory of Operation.

(a) AND-Circuit. (Refer to figure 39.)

With no decoded reply applied to the AND-circuit, the anode of CR28 is at ground, since transistor Q17 is saturated. The base of Q19 is therefore clamped to ground by diode CR28. Any negative video signal applied to CR29 under these conditions will not be applied to Q19.



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Bearing Output and AGC Circuits, Block Diagram
Figure 38

When a decoded reply is applied to CR28, the anode of CR28 is at -12 volts. The smaller negative video pulse that is applied to CR29 under these conditions will then be applied to the base of Q19 since R52 is connected to -18 volts.

(b) Amplifier Q19. (Refer to figure 39.)

The negative pulses (with modulation) from the AND-circuit are applied to the base of Q19. The current through Q19 is increased by the negative pulses, resulting in a positive going pulse at the collector of Q19. This positive going pulse is applied to emitter follower Q20. Transistor Q19 is slightly forward biased during quiescent conditions by the positive voltage at the anode of CR39 to prevent base line clipping at Q19.

(c) Emitter Follower Q20. (Refer to figure 39.)

1. Theory.

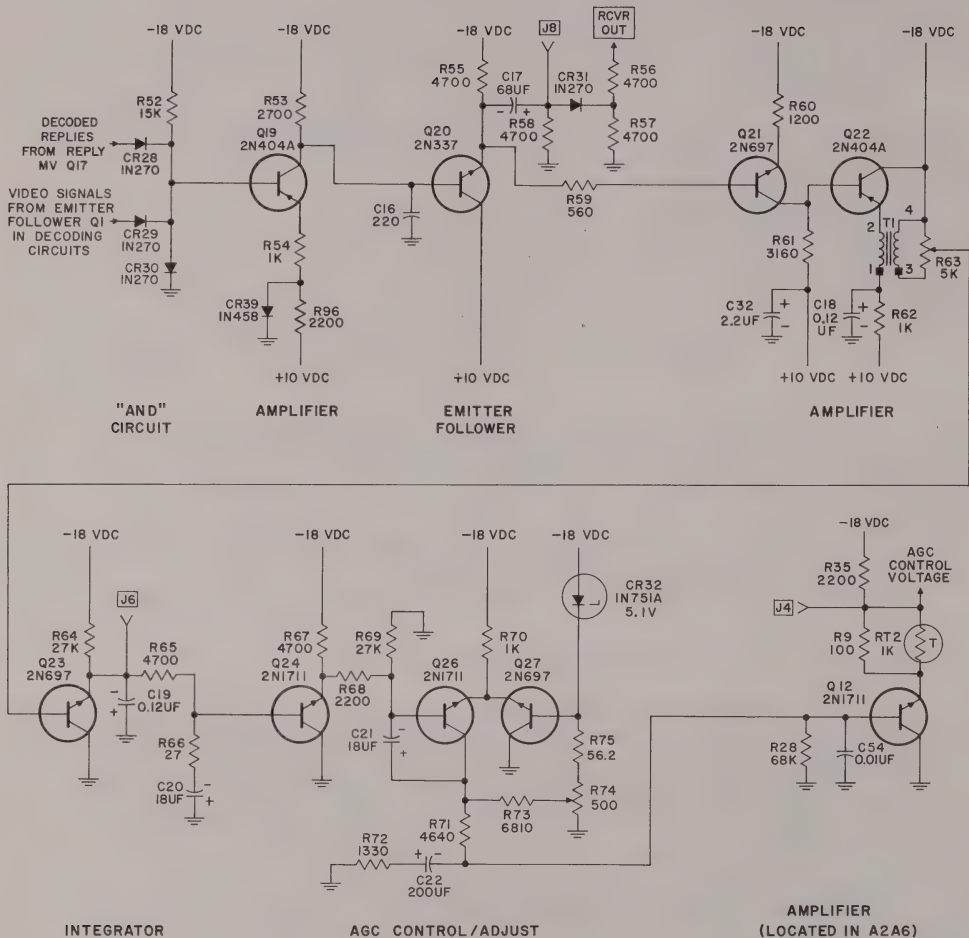
Emitter follower Q20 provides a low output impedance to drive the RCVR OUT jack. The output of Q20 is applied to the RCVR OUT jack through a circuit protecting network, CR31, R57, and R56. This network must be removed and the RCVR OUT jack connected to R58 to obtain low output impedance. Diode CR31 protects the agc circuits in case a positive suppressor pulse is connected to the RCVR OUT jack on the front panel. Resistor R56 protects the agc circuits in case the RCVR OUT jack is short circuited. The output of Q20 is also applied to amplifier Q21 and Q22.

2. Test Points.

Test point J8 permits inspection of the bearing output signal from Q20.



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Bearing Output and AGC Circuits (P/O Modules A2A6 and A3),
Simplified Schematic Diagram
Figure 39

(d) Amplifier Q21 and Q22. (Refer to figure 39.)

1. Theory.

The positive pulse from the emitter follower Q20 is applied to the base of Q21. Transistor Q21 provides a voltage gain of approximately 2.5 and inverts the



signal. The negative pulse is applied to emitter follower Q22 driving it on. The signal at the emitter of Q22 is inverted by T1. A pulse is then developed across the secondary of T1 and R63. A positive pulse is then taken from the wiper on R63 and applied to the integrator.

2. Adjustments.

Variable resistor R63 allows adjustment of the over-all gain of the agc circuits by adjusting the percentage of the output of the amplifier that is to be applied to the integrator. Resistor R63 therefore allows adjustment of the agc threshold.

(e) Integrator. (Refer to figure 39.)

1. Theory.

The positive pulse from Q22 is applied through emitter follower Q23 to the integrating network. Transistor Q23 is cut off between pulses. Capacitor C19 is charged through emitter follower Q23 and discharged through R64 in parallel with the series combination of R65, R66, and C20. Resistors R65 and R66 and capacitor C20 provide additional filtering. The direct voltage on capacitor C20 is applied to the base of Q24.

2. Test Points.

Test point J6 permits examination of the integrator output.

(f) AGC Control/Adjust. (Refer to figure 39.)

1. Theory.

When the d-c signal from the integrator is below the agc threshold level, the d-c voltage applied to emitter follower Q12 is determined by the position of the wiper on potentiometer R74. When the received signal increases, the signal from the integrator through emitter follower Q24 to the base of Q26 becomes more positive. When the voltage at the base of Q26 becomes more positive than the voltage at the emitters of Q26 and Q27, Q26 begins conducting. The voltage at the emitters of Q26 and Q27 is constant at approximately -13.5 volts due to diode CR32 and the base to emitter drop of Q27. When Q26 conducts, the voltage at the collector of Q26 moves negative from the quiescent value set by R74 and causes the gain of the first i-f amplifier to decrease. Capacitors C21 and C22 provide filtering to remove the 15- and 135-cps ripple present due to the bearing information on the signal.

2. Adjustments.

Variable resistor R74 controls the receiver gain at signal levels below agc threshold. The minimum lock-on sensitivity is therefore adjusted by R74.

(g) Amplifier Q12. (Refer to figure 39.)

1. Theory.

When the signal level is below the minimum level for agc action, the agc voltage applied to Q12 is approximately -4 volts as set by R74. As the signal level

increases above the minimum level, the voltage on the base of transistor Q12 becomes more negative. Transistor Q12 is turned off and the agc voltage is driven more negative from -18 volts through R75. The receiver gain is then reduced.

2. Test Points.

Test point J4, located in the first if. amplifier, permits inspection of the level of the agc voltage.

H. Timing Circuits. (Refer to figure 40.)

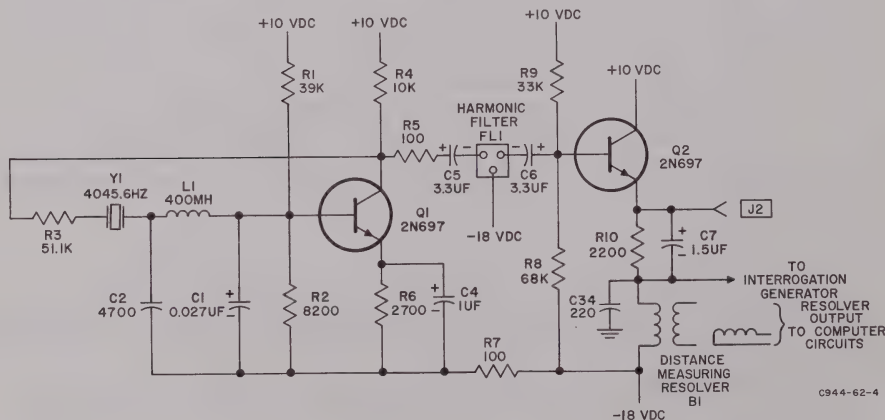
(1) Detailed Theory of Operation.

Transistor Q1 and associated circuitry form the 4045.6-timing oscillator used as a time base for distance computing. The time of one cycle of the 4045.6-Hz signal is equal to the time for a transmitted pulse and a reply pulse to travel 20 nautical miles.

Inductor L1 and capacitors C2 and C1 are resonant at approximately 4 kHz. This network provides impedance matching and phase reversal from the collector to the base of Q1. Selective feedback from collector to base is provided through crystal Y1. The output taken at the collector of Q1 is applied through a harmonic filter to emitter follower Q2. The output of Q2 is applied to the interrogation generator and to the distance measuring resolver in the computing circuits.

(2) Test Points.

Test point J2 permits inspection of the output from the timing circuits.



Timing Circuits (P/O Module A4), Simplified Schematic Diagram
Figure 40



I. Interrogation Generator.

(1) General.

The interrogation generator supplies pulse pairs to the modulator. When the 860E-2 is tuned to an X channel, the pulses are spaced 12 usec apart. When the 860E-2 is tuned to a Y channel, the pulses are spaced 36 usec apart. When changing from X to Y channels, the no. 1 pulse is advanced 24 usec and the no. 2 pulse retains its relative position in reference to the phase of the timing signal. The reason for this is that the travel time for measuring distance is measured from the transmission of the no. 2 pulse to the reception of the no. 2 pulse. There will then be no change in distance indication between X and Y channels.

The average prf of the pulse pairs from the interrogation generator is 146 pulse pairs per second during search and 21 pulse pairs per second during track. The prf is variable in a random manner to prevent the 860E-2 from locking on to the interrogations of, or replies to, another DME.

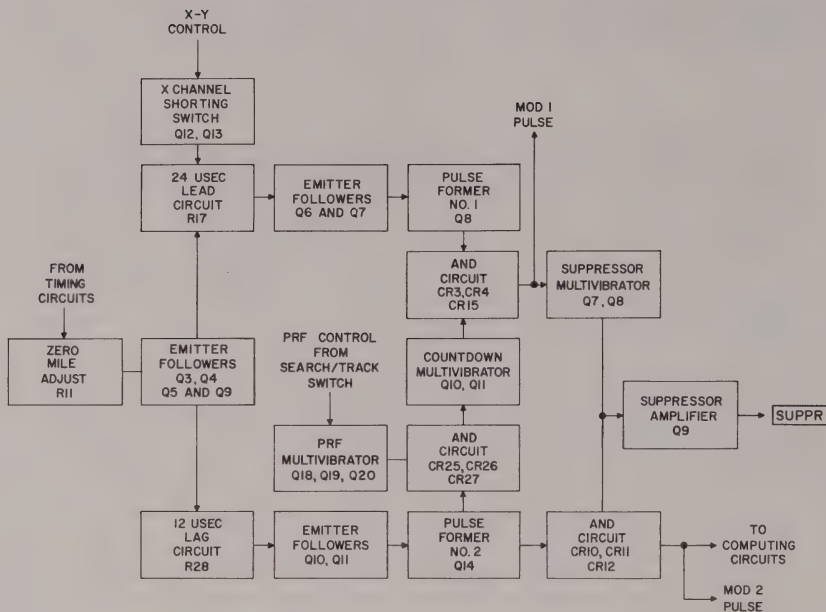
(2) Block Diagram Theory of Operation. (Refer to figure 41.)

The 4045.6-cps sine wave from the timing circuits is applied to the zero-mile adjust network. The zero-mile adjust network ensures the proper time relationship between the no. 2 modulation pulse and the zero crossing of the sine wave applied to the computing circuits. The output of the zero-mile adjust is applied through a series of emitter followers to the 24-usec lead circuit and to the 12-usec lag circuit. When the 860E-2 is tuned to an X channel, the 24-usec lead circuit is shorted to provide zero-degree phase shift. The output of the 24-usec lead circuit is applied through emitter followers Q6 and Q7 to pulse former no. 1. The output of the 12-usec lag circuit is applied through emitter followers Q10 and Q11 to pulse former no. 2. The pulse former produces a pulse at the negative going zero crossing of the applied sine wave. The time difference between the output pulses of the pulse formers is 12 usec on X channels and 36 usec on Y channels, with the output of pulse former no. 1 leading the output of pulse former no. 2.

The output of pulse former no. 2 is applied to AND-circuit CR25, CR26, and CR27 with the output of the prf multivibrator. The output of the prf multivibrator is at a pulse rate of 146 pps during search and a rate of 21 pps during track. The AND-circuit has a pulse output when the output of pulse former no. 2 is time coincident with the pulse output of the prf multivibrator. The pulse from the prf multivibrator is wider than the time between two adjacent pulses from pulse former no. 2 to guarantee coincidence of at least one pulse from pulse former no. 2 with each pulse from the prf multivibrator. The output of AND-circuit CR25, CR26, and CR27 triggers the countdown multivibrator. The output of the countdown multivibrator is applied to AND-circuit CR3, CR4, and CR15 with the output of pulse former no. 1. The output pulse of the countdown multivibrator is long enough so that the first pulse from pulse former no. 1, which follows the pulse from pulse former no. 2 that triggered the countdown multivibrator, is passed. The output of AND-circuit CR3, CR4, and CR15 is applied to the modulator as the no. 1 modulation pulse and to the suppressor multivibrator.



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Interrogation Generator, Block Diagram
Figure 41

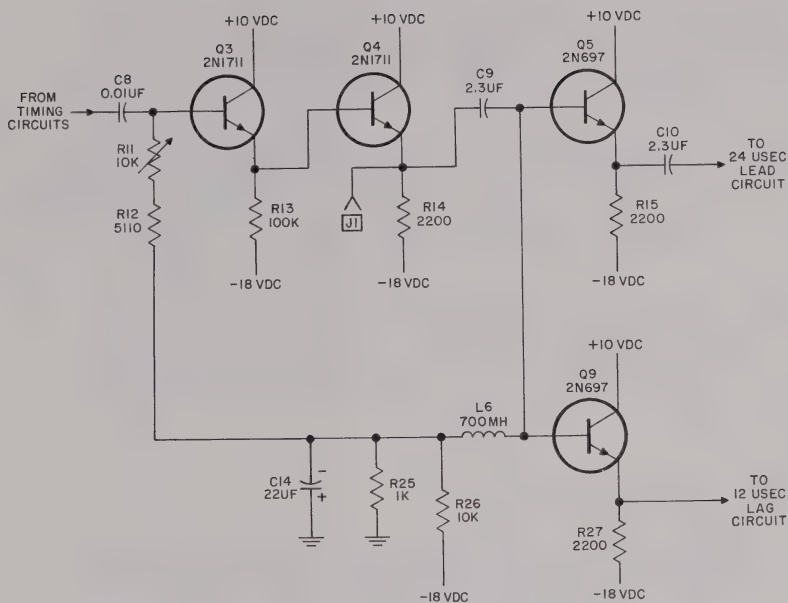
The output of the suppressor multivibrator is amplified by the suppressor amplifier and is applied to the SUPPR OUT jack on the front panel. The output of the suppressor multivibrator is also applied to AND-circuit CR10, CR11, and CR12 with the output of the pulse former no. 2. The output of pulse former no. 2 that immediately follows the pulse from pulse former no. 1, which triggered the suppressor multivibrator, is passed. The output of the AND-circuit is applied to the modulator as the no. 2 modulation pulse. The pulse pair applied to the modulator (MOD 1 pulse and MOD 2 pulse) are either 12 or 36 usec apart depending on the time between the output pulses from the no. 1 and no. 2 pulse former.

(3) Detailed Theory of Operation.

(a) Zero-Mile Adjust and Emitter Followers. (Refer to figure 42.)

1. Theory.

The 4045.6-cps sine wave from the timing circuits is applied to the zero-mile adjust circuit consisting of C8, R11, and R12. The amount of phase shift to the signal is variable by R11. The phase shift is adjusted so that the phase (zero crossing) of the sine wave applied to the pulse forming circuits and the phase of the signal applied to the computing circuits are related so that the indicator displays zero mile when the reply signal is delayed 50 usec.



Zero-Mile Adjust (P/O Module A4), Simplified Schematic Diagram
Figure 42

The output of the zero-mile adjust circuits is applied to emitter follower Q3. The output of Q3 is applied through emitter follower Q4 to Q5 and Q9. The output of Q5 is applied to the 24-usec lead circuit and the output of Q9 is applied to the 12-usec lag circuit. Emitter followers Q3 and Q4 provide a light load to the zero mile adjust circuit so that parameter changes have a minimum effect on the phase shift network. Resistors R25 and R26 in the base circuit of Q9 provide base bias voltage for Q3, Q4, Q5, and Q9. The a-c signals applied to Q3 and Q9 are isolated by L6 and C14.

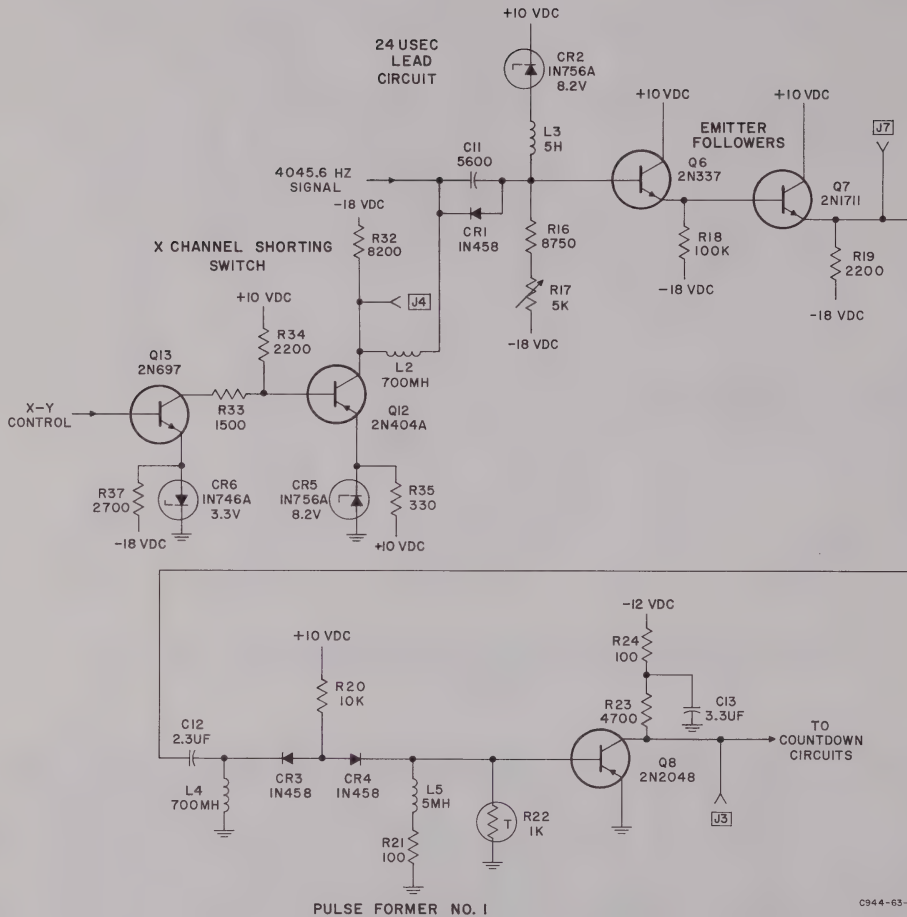
2. Adjustments and Test Points.

Variable resistor R11 is used to adjust indicator zero. Test point J1 allows examination of the phase and shape of the sine wave applied to the interrogation generator circuits.

(b) 24-Usec Lead Circuit and X Channel Shorting Switch. (Refer to figure 43.)

1. Theory.

The 4045.6-cps signal is applied to the 24-usec lead circuit consisting of C11, R16, and R17. The lead circuit advances the phase of the applied sine wave so that the negative going zero crossing is advanced 24 usec.



No. 1 Pulse Forming Circuits (P/O Modules A2A6 and A3), Simplified Schematic Diagram
Figure 43

The X-Y control wire is at approximately -5.5 volts when the 860E-2 is tuned to an X channel. This voltage reverse biases Q13. The voltage at the junction of R33 and R34 (base of Q12) is +10 volts under these conditions. Transistor Q12 is then reverse biased. The voltage at the collector of Q12 is then approximately -6 volts. The voltage at the anode of CR1 is approximately -4 volts. Diode CR1 is forward biased on X channels so the 4045.6-Hz signal bypasses C11 resulting in no phase shift.

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When the 860E-2 is tuned to a Y channel, the X-Y control wire is grounded. Transistor Q13 is then forward biased and the voltage applied to the base of Q14 is approximately +7 volts. Transistor Q12 is then forward biased and the voltage applied to the cathode of CR1 is approximately +8 volts. Diode CR1 is then reverse biased and the 4045.6-cps signal is phase shifted by C11.

The output of the 24-usec lead circuit is applied through emitter followers Q6 and Q7 to pulse former no. 1. The emitter followers prevent loading of the phase shift network.

2. Adjustments and Test Points.

Variable resistor R17 permits adjustment of the Y channel pulse spacing. Test point J4 allows inspection of the operation of the X channel shorting switch. Test point J7 allows inspection of the phase, shape, and amplitude of the 4045.6-cps signal after phase shifting.

(c) Pulse Former No. 1. (Refer to figure 43.)

1. Theory.

The 4045.6-cps signal is applied through C12 to pulse former no. 1. The average value of the voltage at cathode of CR3 is held at zero volt because of the low d-c resistance of L4. During the positive half cycle of the sine wave, diode CR3 is reverse biased and diode CR4 is forward biased. The major current flow is through R20, CR4, L5, and R21. When the sine wave goes negative, the cathode of diode CR3 is pulled negative, and the current through R20 is increased so that CR4 becomes reverse biased. The current flowing through L5, prior to the time CR4 is reverse biased, is directed to R22 in parallel with the base emitter circuit of Q8 and decays exponentially. Transistor Q8 is reverse biased when CR4 is conducting and is saturated after CR4 is reverse biased. The voltage at the collector of Q8 goes in a positive direction from -12 volts during this time, resulting in a positive pulse. The pulse width is determined by the decay of current in L5. This positive pulse is applied to the countdown circuits.

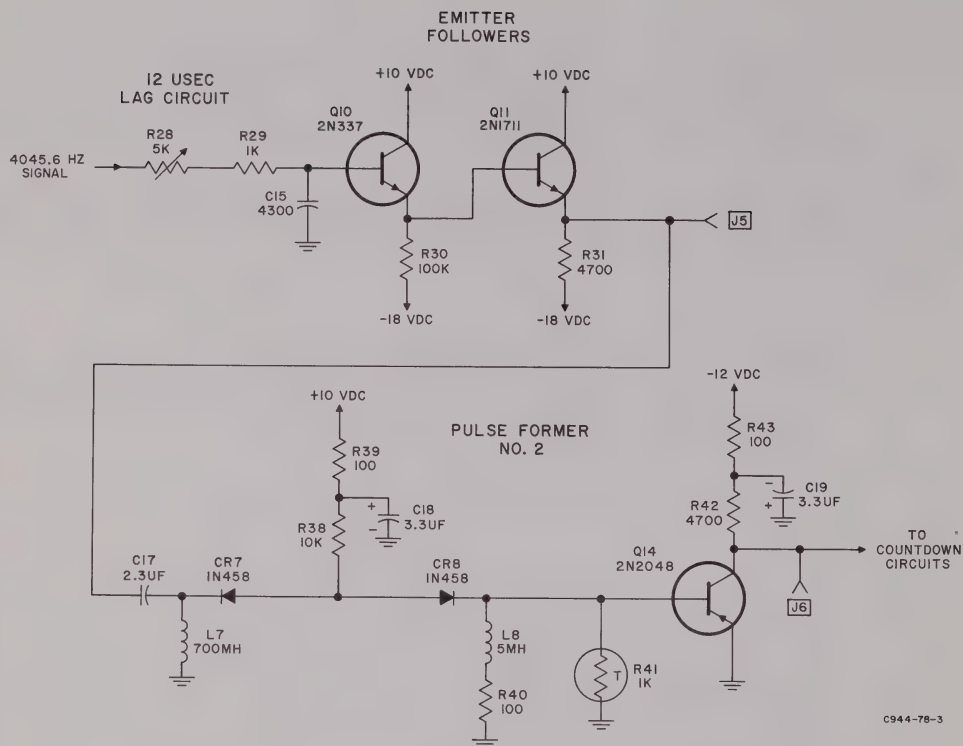
2. Adjustments and Test Points.

Test point J3 allows inspection of the shape, frequency, and spacing of the pulses from pulse former no. 1.

(d) 12-Usec Lag Circuit and Pulse Former No. 2. (Refer to figure 44.)

1. Theory.

Resistors R28, R29 and capacitor C15 form the 12-usec lag circuit. The phase of the sine wave is shifted by these components so that the negative going zero crossing is shifted back 12 usec. Emitter follower Q10 and Q11 prevent loading of the phase shift network. The operation of the remaining circuits in figure 44 is the same as those described in paragraph 6.I.(3)(c).



No. 2 Pulse Forming Circuits (P/O Module A4), Simplified Schematic Diagram
Figure 44

2. Adjustments and Test Points.

Resistor R28 permits adjustment of the X channel pulse spacing. Test point J5 allows inspection of the phase, shape, and amplitude of the phase shifted sine wave. Test point J6 allows inspection of the shape, frequency, and spacing of the pulses from pulse former no. 2.

(e) PRF Multivibrator. (Refer to figure 45.)

1. Theory.

Transistors Q18, Q19, and Q20 make up the astable prf multivibrator. Transistor Q17 is a switch to change the pulse rate of the multivibrator. The output pulse from the prf multivibrator is taken from the collector of Q18. When Q18

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is on, the collector of Q18 is at its most negative voltage. When Q18 is cut off, the collector of Q18 is at its most positive voltage. The positive voltage is the signal used to gate the pulses from pulse former no. 2. The cutoff time of Q18 (positive pulse length) is determined by the RC time constant of R87 and C36; this time is the same for search or track operation. The on time of Q18 (time between positive output pulses) is determined by the charge time of C35 through R80, R79, and R78 in parallel with R83, R82, and R81 at the search prf; and R80, R79, and R78 at the track prf. If Q17 is cut off (search/track switch control at +5.5 volts, track mode), the charge time of C35 is long enough to produce a prf of positive pulses of 21 pps. If Q17 is on (search/track switch at -1.5 volts, search mode), the charge time of C35 is shortened to produce a prf of positive pulses of 146 pps. Emitter follower Q19 is used to discharge C35 at the beginning of each positive pulse at the collector of Q18.

2. Adjustments and Test Points.

Variable resistor R78 is used to adjust the pulse rate of the prf multivibrator for proper rate during track. Variable resistor R83 is used to adjust the rate of the prf multivibrator during search.

(f) PRF Multivibrator and No. 2 Pulses AND-Circuit. (Refer to figure 45.)

1. Theory.

When neither the positive pulse from the prf multivibrator or the positive pulse from the pulse former no. 2 are applied to the AND-circuit, diodes CR25, CR26, and CR27 are conducting. With either or both CR26 and CR27 conducting, the voltage at the anodes of CR26 and CR27 is approximately -5 volts. When the positive pulse from the prf multivibrator is applied to the AND-circuit, diode CR27 is reverse biased. The voltage at the cathode of CR25 remains at -5 volts because CR26 is conducting. When the positive pulse from pulse former no. 2 is applied to the base of Q12, transistor Q12 is turned on and the voltage at the collector of Q12 moves toward +10 volts. Diode CR26 is then back biased for the duration of the pulse from pulse former no. 2. With both CR26 and CR27 back biased, CR25 is reverse biased and the voltage at the cathode of CR25 goes from -5 volts towards +10 volts. This positive pulse is coupled by C24 and CR22 to the countdown multivibrator.

2. Test Points.

Test point J3 is used to observe the output of the AND-circuit. Test point J9 permits inspection of the -5-volt supply.

(g) Countdown Multivibrator. (Refer to figure 45.)

Transistors Q10 and Q11 make up the countdown multivibrator. With no pulse applied to the countdown multivibrator, the base of Q10 is at approximately -11 volts because of R43 and CR16. This voltage on the base of Q10 holds Q10 in saturation. With Q10 in saturation, the voltage at the collector of Q10 is approximately -11 volts. The voltage applied to the base of Q11 under these conditions



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is approximately -13 volts due to the voltage divider action of R45 and R31 between -18 volts and the voltage on the collector of Q10. This voltage on the base of Q11 reverse biases Q11.

When a positive trigger is applied to the base of Q11, transistor Q11 becomes forward biased and begins to conduct. This causes the voltage on the collector of Q11 to move from +10 volts in a negative direction. This negative change is coupled through capacitor C17 to the anode of CR16. Diode CR16 becomes cut off, and the voltage at the base of Q10 moves toward -12 volts. Transistor Q10 is then cut off and the voltage at the collector moves from -11 volts towards +10 volts. This drives Q11 into saturation. After C17 discharges through R43, the multivibrator returns to its original state. The positive pulse at the collector of Q10 is applied to the AND-circuit (CR15).

During modulator off time, the interrogation inhibit (see paragraph 6.O.) is at a positive voltage. This positive voltage is applied through R89 and CR37 to the base of Q10. Transistor Q10 is then held in saturation resulting in no output pulse.

- (h) Countdown Multivibrator and No. 1 Pulses AND-Circuit. (Refer to figure 45.)

1. Theory.

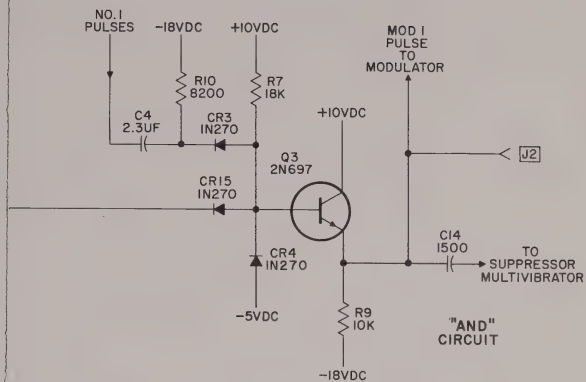
The no. 1 pulses and the output pulse from the countdown multivibrator are applied to the cathodes of CR3 and CR15, respectively. When either or both CR3 and CR15 are conducting, the voltage applied to the base of Q3 is approximately -5 volts. The voltage on the emitter of Q3 under these conditions is approximately -6 volts. When both positive pulses are applied to diodes CR3 and CR15 at the same time, CR3, CR4, and CR15 are reverse biased. The voltage at the base of Q3 then increases to +5 volts. The emitter voltage increases from -6 to +4 volts under these conditions. This positive pulse is applied to the modulator and to suppressor amplifier Q9.

2. Test Points.

Test point J2 permits inspection of the output of the AND-circuit.

- (i) Suppressor Multivibrator. (Refer to figure 46.)

Transistors Q7 and Q8 make up the suppressor multivibrator. With no signal applied to the multivibrator, transistor Q7 is held in saturation due to the voltage applied to the base of Q7 by R48 and CR13. When Q7 is saturated, the voltage at the collector of Q7 is approximately -11 volts. Transistor Q8 is reverse biased due to the voltage applied to the base by voltage divider R47 and R25. When the positive trigger is applied to the base of Q8, Q8 is forward biased and the collector of Q8 moves from +10 volts toward -11 volts. Diode CR21 is forward biased and the voltage at the anode of CR21 moves from +10 volts in a negative direction. This negative change in voltage is coupled through C13 to the anode of CR13. Diode CR13 is reverse biased and Q7 is cut off. The voltage at the collector of Q7 then moves from -11 volts to +9 volts. This change is applied to the base of Q8 to drive it into saturation. After C13 becomes charged through R48, diode CR13 is again forward biased and the multivibrator returns to its original state.



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No. 1 Modulation Pulse Generator Circuits (P/O
Module A6), Simplified Schematic Diagram
Figure 45



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is approximately -13 volts due to the voltage divider action of R45 and R31 between -18 volts and the voltage on the collector of Q10. This voltage on the base of Q11 reverse biases Q11.

When a positive trigger is applied to the base of Q11, transistor Q11 becomes forward biased and begins to conduct. This causes the voltage on the collector of Q11 to move from +10 volts in a negative direction. This negative change is coupled through capacitor C17 to the anode of CR16. Diode CR16 becomes cut off, and the voltage at the base of Q10 moves toward -12 volts. Transistor Q10 is then cut off and the voltage at the collector moves from -11 volts towards +10 volts. This drives Q11 into saturation. After C17 discharges through R43, the multivibrator returns to its original state. The positive pulse at the collector of Q10 is applied to the AND-circuit (CR15).

During modulator off time, the interrogation inhibit (see paragraph 6.O.) is at a positive voltage. This positive voltage is applied through R89 and CR37 to the base of Q10. Transistor Q10 is then held in saturation resulting in no output pulse.

- (h) Countdown Multivibrator and No. 1 Pulses AND-Circuit. (Refer to figure 45.)

1. Theory.

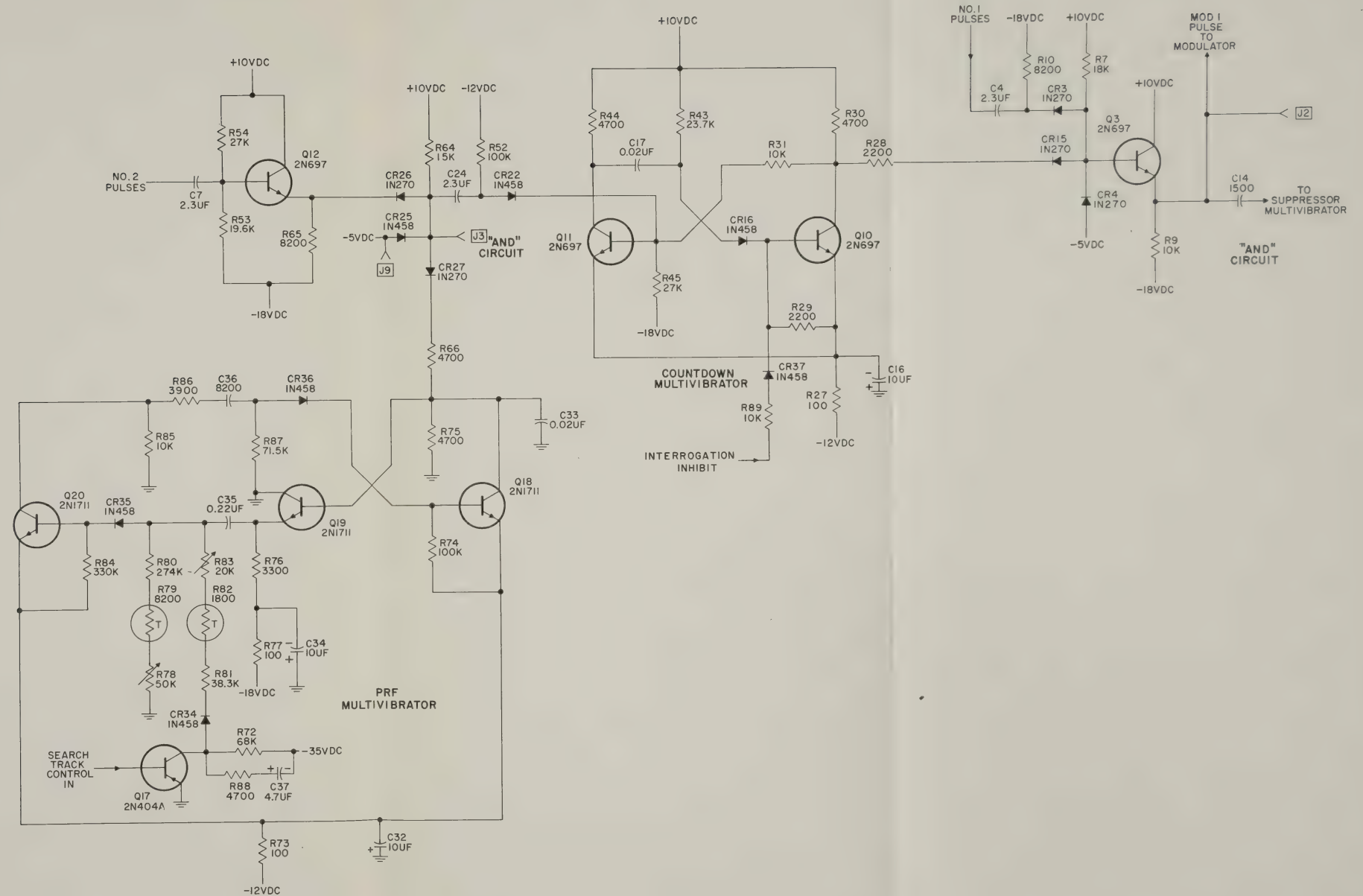
The no. 1 pulses and the output pulse from the countdown multivibrator are applied to the cathodes of CR3 and CR15, respectively. When either or both CR3 and CR15 are conducting, the voltage applied to the base of Q3 is approximately -5 volts. The voltage on the emitter of Q3 under these conditions is approximately -6 volts. When both positive pulses are applied to diodes CR3 and CR15 at the same time, CR3, CR4, and CR15 are reverse biased. The voltage at the base of Q3 then increases to +5 volts. The emitter voltage increases from -6 to +4 volts under these conditions. This positive pulse is applied to the modulator and to suppressor amplifier Q9.

2. Test Points.

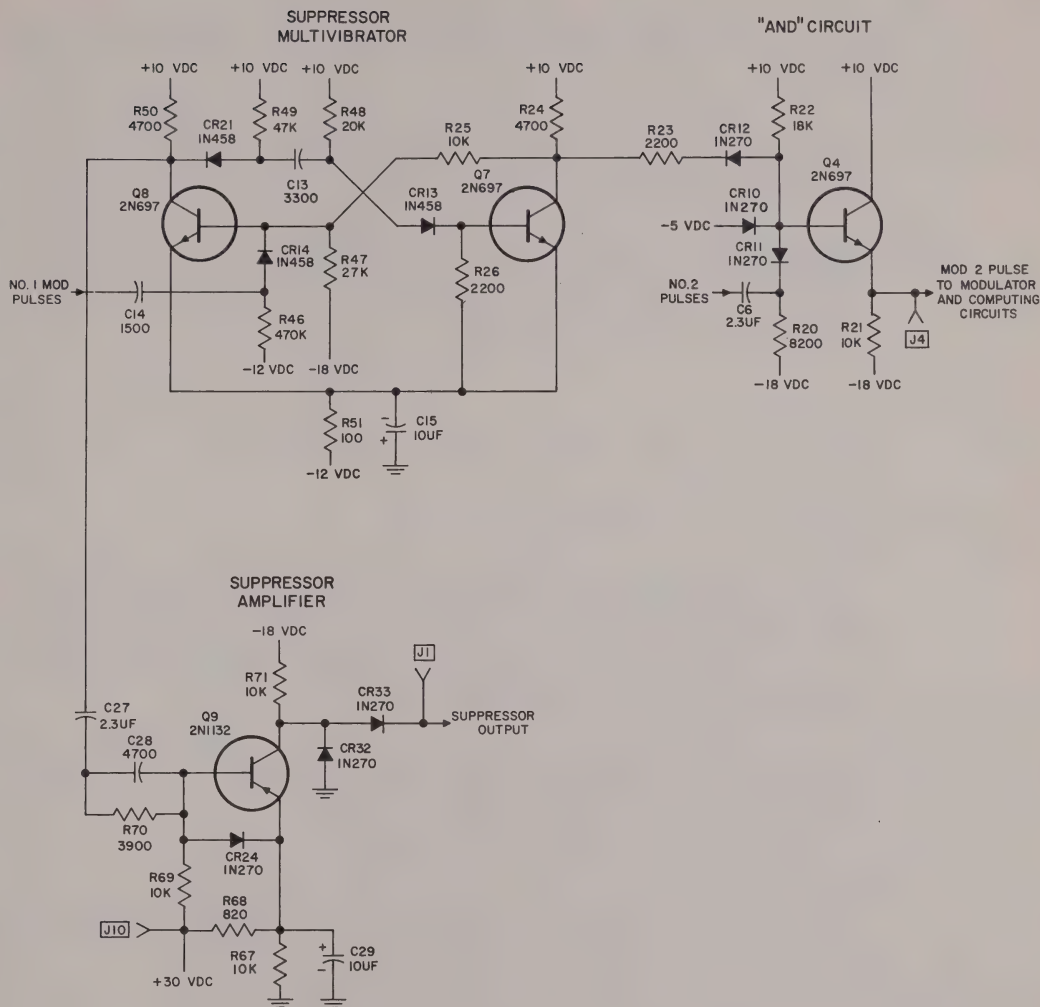
Test point J2 permits inspection of the output of the AND-circuit.

- (i) Suppressor Multivibrator. (Refer to figure 46.)

Transistors Q7 and Q8 make up the suppressor multivibrator. With no signal applied to the multivibrator, transistor Q7 is held in saturation due to the voltage applied to the base of Q7 by R48 and CR13. When Q7 is saturated, the voltage at the collector of Q7 is approximately -11 volts. Transistor Q8 is reverse biased due to the voltage applied to the base by voltage divider R47 and R25. When the positive trigger is applied to the base of Q8, Q8 is forward biased and the collector of Q8 moves from +10 volts toward -11 volts. Diode CR21 is forward biased and the voltage at the anode of CR21 moves from +10 volts in a negative direction. This negative change in voltage is coupled through C13 to the anode of CR13. Diode CR13 is reverse biased and Q7 is cut off. The voltage at the collector of Q7 then moves from -11 volts to +9 volts. This change is applied to the base of Q8 to drive it into saturation. After C13 becomes charged through R48, diode CR13 is again forward biased and the multivibrator returns to its original state.



No. 1 Modulation Pulse Generator Circuits (P/O
Module A6), Simplified Schematic Diagram
Figure 45



Countdown Circuits (P/O Module A5), Simplified Schematic Diagram
Figure 46

Capacitor C13 discharges through R49 during this time. Diode CR21 is reverse biased preventing the discharge of C13 from affecting the trailing edge of the pulse at the collector of Q8. The positive pulse from the collector of Q7 is applied to the AND-circuit. The negative pulse from the collector of Q8 is applied to the suppressor amplifier.



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- (j) Suppressor Multivibrator and No. 2 Pulse AND-Circuit. (Refer to figure 46.)

1. Theory.

With no pulse input to the AND-circuit, diodes CR10, CR11, and CR12 are conducting and the voltage applied to the base of Q4 is approximately -5 volts. When both the output of the suppressor multivibrator and a no. 2 pulse is applied to the AND-circuit, diodes CR10, CR11, and CR12 are reverse biased. This causes the voltage at the base of Q4 to increase to +5 volts. The positive pulse is applied through emitter follower Q4 to the modulator as the no. 2 modulation pulse and to the computing circuits. When only a no. 2 pulse is applied to the AND-circuit, CR11 is reverse biased. Diodes CR10 and CR12 remain forward biased and no useful output is obtained from the AND-circuit.

2. Test Points.

Test point J4 permits inspection of the no. 2 modulation pulse.

- (k) Suppressor Amplifier. (Refer to figure 46.)

1. Theory.

With no pulse applied to the suppressor amplifier, diode CR24 is forward biased and the voltage applied to the emitter of Q9 is approximately +28 volts. The voltage applied to the base of Q9 is slightly more positive than +28 volts so that Q9 is cut off. Diode CR32 is forward biased so that the voltage at the collector of Q9 is approximately zero volt. The negative pulse from the suppressor multivibrator is coupled by C27 to Q9 through speedup network R70 and C28.

Transistor Q9 is forward biased for the duration of the applied pulse. The voltage at the collector of Q9, which was approximately ground when no pulse was applied, is at approximately 25 volts during the pulse. This positive pulse is applied through CR33 to the SUPPR jack on the front panel.

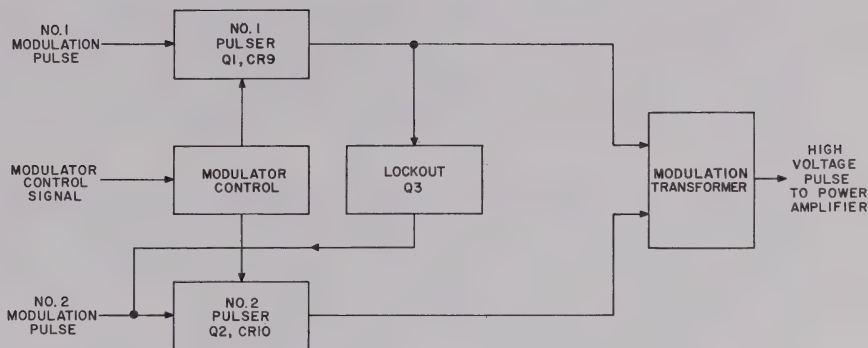
2. Test Points.

Test point J1 permits inspection of the suppressor output pulse. Test point J10 permits inspection of the +30-volt supply.

J. Modulator.

- (1) Block Diagram Theory of Operation. (Refer to figure 47.)

The no. 1 modulation pulse from the interrogation generator is applied to the no. 1 pulser. The output of the pulser is coupled by the modulation transformer to the plates of the power amplifiers. The no. 2 pulser operates from the no. 2 modulation pulse and is coupled to the modulation transformer. A ground from the lockout circuit is applied to disable pulser no. 2 until pulser no. 1 has been turned on. This ensures that externally generated transients on the power lines do not trigger pulsers no. 1 and no. 2 simultaneously. The modulator control signal is applied to the modulator control. The modulator control prevents interrogations during modulator off time (see paragraph 6.O.).



Modulator, Block Diagram
Figure 47

(2) Detailed Theory of Operation.

(a) No. 1 Pulser. (Refer to figure 48.)

The no. 1 modulation pulse from the interrogation generator is applied through C2 and CR7 to the base of emitter follower Q1. Transistor Q1 is cut off before the application of the pulse and the emitter of Q1 is at ground potential. The pulse, applied to the base of Q1, drives Q1 into conduction. The voltage at the emitter of Q1 goes positive, triggering CR9. Capacitor C4, having been charged to approximately 300 volts by the previous pulsing operation, is discharged through CR9, the primary of T1, and the a-c resistance reflected through T1 from the power amplifier. The a-c resistance is shunted by R13. Resistor R13 swamps the a-c resistance reflected from the power amplifier to reduce the variations in the performance of the series resonant circuit formed by C4 and the primary of T1. Since the primary windings of T1 are very closely coupled, R13 also swamps the no. 2 pulser. Capacitor C4 and inductor p/o T1 make up a series resonant circuit so the resulting voltage across R13 closely approximates a half sine wave. The amplitude of the half sine wave is increased by T1 and applied to the power amplifier as a high voltage pulse.

At the end of the pulse, stored energy in C4 drives the anode of CR9 negative, causing CR9 to cut off. When CR9 turns off, C4 charges through R12, L1, CR21, the primary of T1, and effectively CR11, since the primary windings of T1 are closely coupled. Capacitor C4 and inductor L1 are resonant so that C4 charges to approximately twice the supply voltage. When C4 has charged to approximately 300 volts, the peak of the resonant cycle is reached. Diode CR21 is then reverse biased and prevents C4 from discharging to 150 volts.

When the anode of CR9 is driven negative, prior to the charging of C4, CR13 and CR3 conduct since the modulator control voltage is zero. Capacitor C2 is charged and the anode of CR7 is negative. When C4 charges and the anode of CR9 goes



positive, diodes CR13 and CR3 are reverse biased. Capacitor C2 discharges through R20 in parallel with R4 with a time constant of approximately 480 usec. The anode of CR7 is therefore held negative long enough after the triggering of CR9 to allow C4 to fully charge (150 usec). This prevents any pulse applied to C2 from triggering CR9 before C4 is fully charged. If CR9 is turned on before C4 is fully charged, the negative kick to turn off CR9 will not be present, and an excessive steady state current from the power supply will blow fuse F1.

Capacitor C6 and resistor R19 form a filter network to prevent a positive pulse from being applied through C2 and C14, on the trigger line of the suppressor multivibrator, to the suppressor multivibrator during the charge of C4. (See figures 45 and 46.) The presence of such a trigger could produce two suppressor pulses for each interrogation. Capacitor C6 is charged to +10 volts through R19 between modulator pulses to prevent loading of the pulse applied to the modulator.

Resistor R12 slightly reduces the power output from the no. 1 pulser to obtain equal outputs from the two pulsers. When the value of R12 is increased, and a resistor equal to the increase in R12 is inserted into the no. 2 pulser where shown, the power output from T1 is reduced. This reduction will lower transmitter power output.

(b) Lockout Circuit. (Refer to figure 48.)

Transistor Q3 is conducting before CR9 is triggered. Ground applied through Q3 to the base of Q2 prevents Q2 from conducting and triggering CR10. When CR9 is triggered, a negative going voltage from the anode of CR9 is applied through CR15 to turn off Q3. The ground is thereby removed from the base of Q2 enabling number 2 trigger circuitry.

(c) No. 2 Pulser. (Refer to figure 48.)

The no. 2 pulser operates the same as the no. 1 pulser discussed in paragraph 6.J.(1)(a). The no. 2 pulser does not have the 2.2-ohm resistor in the anode circuit of CR9 to equalize the output pulses. Transistors Q2 and Q1 use the same RC filter in the B+ supply.

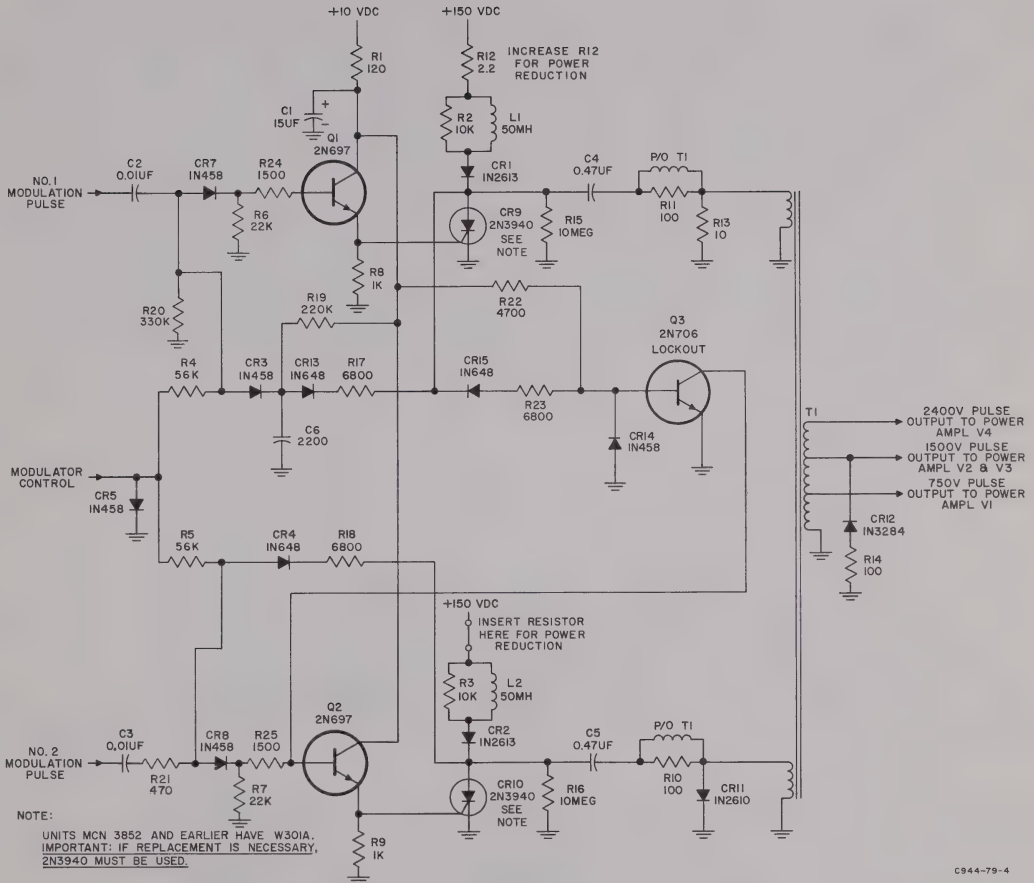
(d) Modulator Control. (Refer to figure 48.)

The modulator control signal is applied through resistors R4 and R5 to the anodes of CR7 and CR8, respectively. When the modulator is on, the modulator control signal is at ground potential. Diodes CR7 and CR8 are zero biased and the positive modulator pulses are passed to the bases of Q1 and Q2. When the modulator is turned off, the modulator control signal is at -18 volts. This voltage reverse biases diodes CR7 and CR8 and blocks the modulation pulses from the bases of Q1 and Q2. For a discussion of the origin of the modulator control signal, see paragraph 6.O.

K. Computing Circuits.

(1) General.

The computing circuits measure distance by measuring the time interval between the transmission of the second interrogation pulse and the reception of the second reply pulse. The computing circuits search for the reply signal by examining a small increment of the total possible time. This is done by driving a range gate from zero time outward and examining the decoded replies that are time coincident with the range gate. Because of squitter pulses, reference burst pulses, and replies to other



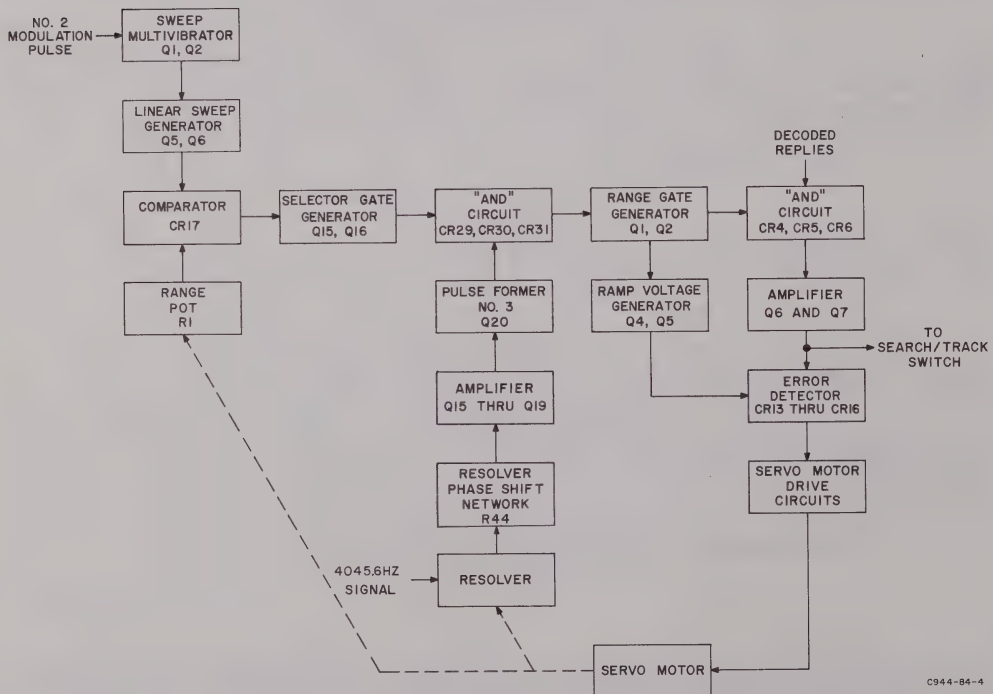
Modulator (P/O Module A2A4), Simplified Schematic Diagram
Figure 48

aircraft interrogations, there will be decoded replies coincident with the range gate at all times. When the range gate and the second reply pulses are time coincident, there is a sharp increase in the decoded replies coincident with the range gate. This increase is sensed by the search/track switch and the 860E-2 is switched to track mode. The position of the range gate during track mode is determined by the error between the decoded replies and the center of the range gate.



(2) Block Diagram Theory of Operation. (Refer to figure 49.)

The no. 2 modulation pulse is applied to the sweep multivibrator Q1 and Q2. The sweep multivibrator output is applied to the linear sweep generator Q5 and Q6. The linear sweep output is a ramp voltage starting with a small step at zero and increasing at a constant rate. When the amplitude of the voltage from the linear sweep generator equals the voltage across the range potentiometer a trigger is applied to the selector gate generator Q15 and Q16. The selector gate generator output is a pulse with a time width corresponding to slightly less than 20 radar miles. The selector gate is applied to AND-circuit CR29, CR30, and CR31 with the output of pulse former no. 3. The output from pulse former no. 3 is a series of pulses with a spacing equal to the radar time corresponding to 20 nautical miles. These pulses are shifted in time by phase shifting the 4045.6-Hz signal from the timing circuits. The shifted sine wave is amplified and applied to pulse former no. 3. Pulse former no. 3 produces a pulse output at every negative going zero crossing of the applied sine wave. The range gate generator is triggered by the pulse from pulse former no. 3 that is coincident with the selector gate. The selector gate can then be considered as a coarse distance measurement (20-mile increment) and the pulse from pulse former no. 3 as a fine measurement.



C944-84-4

Computing Circuits, Block Diagram
Figure 49

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The output of the range gate generator (range gate) is applied to AND-circuit CR4, CR5, and CR6 with the decoded replies and to the ramp voltage generator. The AND-circuit has a pulse output for every decoded reply that is time coincident with the range gate. The output of the AND-circuit is amplified and applied to the search/track switch and to the error detector with the output of the ramp voltage generator. The ramp voltage generator has a sawtooth output with a zero crossing at the center of the range gate. If the output of the AND-circuit is in the center of the range gate, the output of the error detector is zero. If the output of the AND-circuit is in the first half of the range gate, the error detector has a positive output. If the output of the AND-circuit is in the last half of the range gate, the error detector has a negative output. The output of the error detector is applied to the servo drive circuits.

When the 860E-2 is in track, as determined by the number of decoded replies that are time coincident with the range gate, the signal from the error detector is used to drive the servo motor to produce zero error. If the 860E-2 is in search mode, a drive signal is applied to the servo motor to drive the range gate until lock-on is achieved. For a complete description of the search/track circuits see paragraph 6.M. For a complete description of the servo drive circuits see paragraph 6.L.

(3) Detailed Theory of Operation.

(a) Sweep Multivibrator. (Refer to figure 50.)

1. Theory.

Transistors Q1 and Q2 make up the sweep multivibrator. With no trigger applied to the sweep multivibrator, the positive voltage applied to the base of Q2 by R2 and CR1 holds Q2 in saturation. The collector of Q2 is at ground potential when Q2 is saturated. The voltage applied to the base of Q1 when Q2 is in saturation is approximately -1.5 volts. This voltage reverse biases Q1.

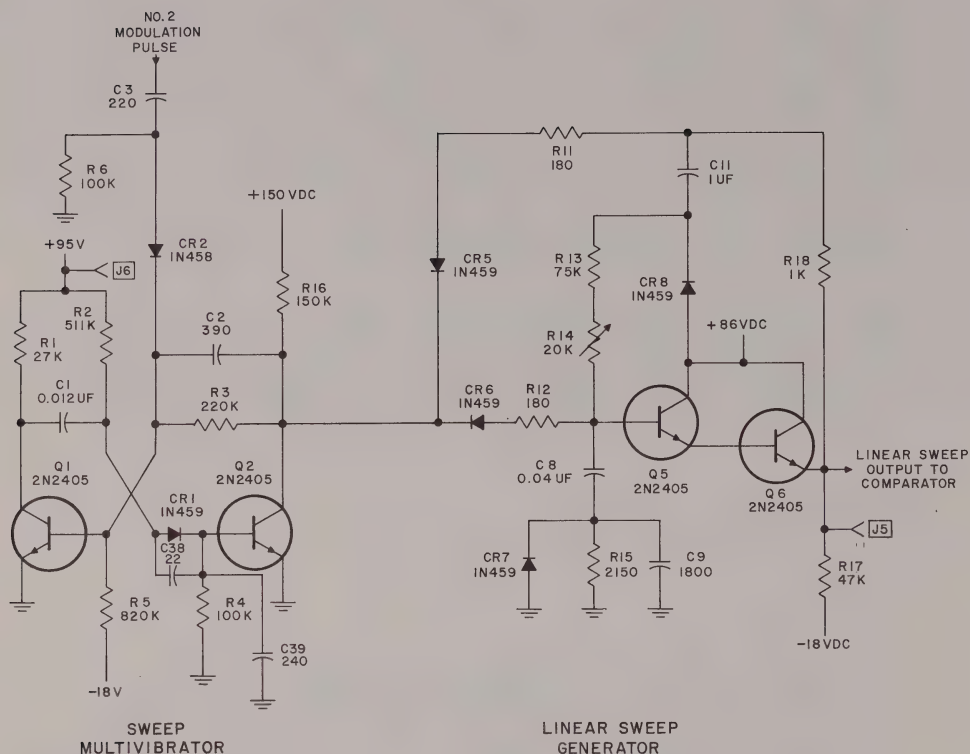
When the no. 2 modulation pulse is applied through CR2 to the base of Q1, transistor Q1 is forward biased. The collector voltage of Q1 moves from +95 volts toward zero when Q1 begins conducting. This negative change is coupled by C1 to the anode of CR1. Diode CR1 is reverse biased by this voltage and Q2 is cut off. The voltage at the collector of Q2 increases from 0 to +90 volts when Q2 is cut off. This change in the voltage at the collector of Q2 holds Q1 in saturation. After C1 charges through R2, diode CR1 becomes forward biased and the multivibrator returns to its original state. The length of the output pulse, taken at the collector of Q2, is determined by the time constant of R2 and C1. The output pulse is approximately 4300 usec long which corresponds to a 350-mile range. The no. 2 modulation pulse is used to trigger the sweep multivibrator Q1 and Q2 instead of the no. 1 modulation pulse so that no timing shift occurs in the coarse ranging system on X or Y channels.

2. Test Points.

Test point J6 permits inspection of the +95-volt supply.



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Linear Sweep Circuits (P/O Module A5), Simplified Schematic Diagram
Figure 50

(b) Linear Sweep Generator. (Refer to figure 50.)

1. Theory.

Prior to triggering the sweep multivibrator, Q2 is saturated, and the voltage at the base of Q5 is nearly zero volt. Capacitor C8 has no charge on it under these conditions and the voltage at the emitter of Q6 is approximately zero volt. Capacitor C11 is charged to +86 volts, since one side is connected to the emitter of Q6 through R18 and the other side is connected to +86 volts through CR8.

When sweep multivibrator is triggered, Q2 is cut off and the collector of Q2 rises to +90 volts and diodes CR5 and CR6 are reverse biased. Capacitor C8



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then begins to charge through R13 and R14. As the voltage on C8 (base of Q5) increases, the voltage at the emitter of Q6 increases at nearly the same rate due to emitter follower action. This increases the voltage on the side of C11 that was at ground. The voltage at the cathode of CR8 increases at the same rate as the voltage at the emitter of Q6. The voltage across resistors R13 and R14 therefore remains constant. Since the voltage across R13 and R14 remains constant, the current through them remains constant, causing C8 to charge at a constant rate. The output of the linear sweep generator is therefore a sweep voltage from 0 to 86 volts at a rate determined by the RC time constant of R13, R14, and C8.

When the sweep voltage starts, an abrupt positive jump of voltage occurs because of R15. Following the positive jump the voltage at the base of Q5 rises linearly. During the sweep period, the charge on C11 increases slightly so that at the end of the sweep the voltage across C11 is greater than +86 volts. Capacitor C11 discharges through CR8, R11, and CR5 to +86 volts at the end of the sweep when Q2 becomes saturated. Recovery of the circuit is thus provided so that minimum change of the linear ramp is obtained between search and track prf.

2. Adjustments and Test Points.

Test point J5 permits examination of the output of the linear sweep generator. Variable resistor R14 permits adjustment of the charge rate of C8 and therefore the slope of the linear sweep output.

(c) Comparator. (Refer to figure 51.)

1. Theory.

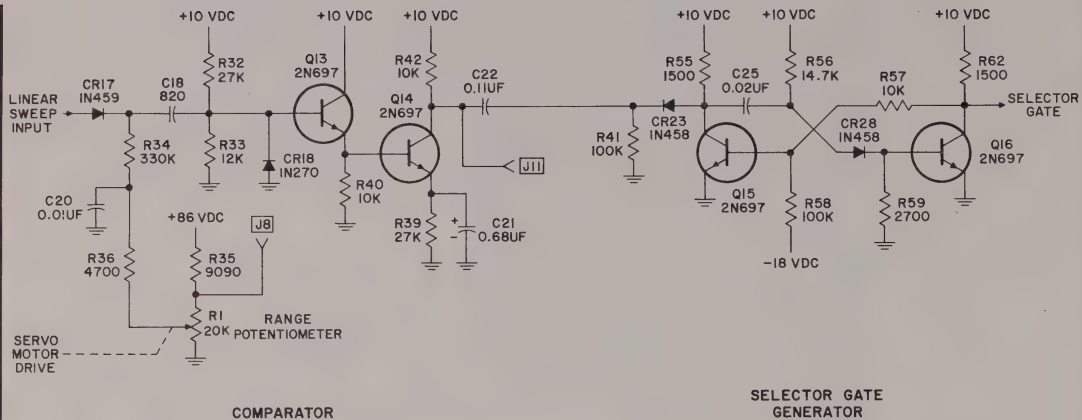
The linear sweep voltage is applied to the anode of CR17. The cathode of CR17 is connected to the arm of the range potentiometer through R34 and R36. The arm of the range potentiometer is driven by the servo motor. The voltage at the arm of the range potentiometer corresponds to distance.

When the linear sweep voltage is less than the voltage from the range potentiometer, diode CR17 is reverse biased. When the linear sweep voltage becomes more positive than the voltage from the range potentiometer, diode CR17 is forward biased and the linear sweep voltage is applied to C18. This increase in voltage is applied through emitter follower Q13 to the base of Q14. This positive ramp voltage is amplified by Q14 and causes the voltage at the collector of Q14 to move in a negative direction. This negative change is coupled by C22 to the selector gate generator.

In the circuit as shown, R35 limits the voltage across the range potentiometer to approximately 59 volts and limits the range capability to 200 miles. The 59-volt limit represents approximately $\frac{2}{3}$ of the capability of the linear sweep circuit. When a 300-mile distance mechanism is used, the resistance between the junction of R35 and the 86-volt supply is reduced to nearly zero ohm and the 300-mile capability of the linear sweep circuit is obtained. Since both ends of R35 are available in the distance mechanism module, no changing in the circuitry on board A5 is necessary to obtain 300-mile capability.



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Selector Gate Circuits (P/O Modules A5 and A8), Simplified Schematic Diagram
Figure 51

2. Test Points.

Test point J8 permits inspection of the voltage across the range potentiometer. Test point J11 provides a means of inspecting the selector gate trigger at the collector of Q14.

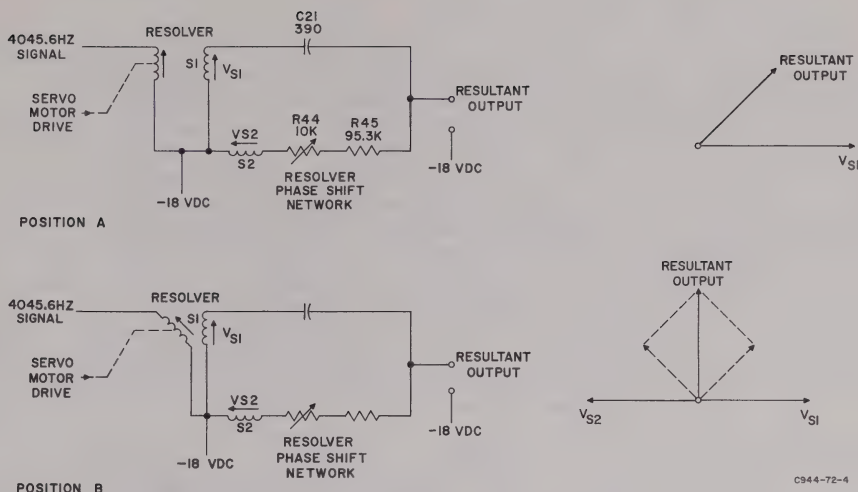
(d) Selector Gate Generator. (Refer to figure 51.)

Transistors Q15 and Q16 make up the selector gate generator. With no pulse applied to the circuit, transistor Q16 is in saturation. The collector of Q16 is at ground potential when Q16 is saturated, holding Q15 cut off. When the negative trigger from the comparator is applied, the collector of Q15 is pulled in negative direction. This negative change in the voltage at the collector of Q15 is coupled by C25 to the anode of CR28. Diode CR28 is reverse biased causing Q16 to be cut off. The voltage at the collector of Q16 then increases to +9 volts. This change in voltage forward biases Q15 to saturation. After C25 charges through R56, the multivibrator returns to its original state. The output of the selector gate generator, taken at the collector of Q16, is a positive pulse approximately 200 usec in duration.

(e) Resolver Phase Shift Network. (Refer to figure 52.)

1. Theory.

The 4045.6-cps signal from the timing circuits (see paragraph 6.H.) is applied to the rotor of the distance measuring resolver. When the rotor is in position A, the voltage developed in stator winding S1 (V_{S1}) is at a maximum and the voltage developed in winding S2 (V_{S2}) is zero. At 4045.6 cps the impedance of C21 is equal to the impedance of R44 and R45. The resultant output is then phase shifted (lead) with respect to V_{S1} by 45 degrees.



Resolver Phase-Shift Network, (P/O Modules A4 and A8), Simplified Schematic Diagram
Figure 52

When the rotor is advanced 45 degrees to position B, output V_{S1} decreases in magnitude and output V_{S2} increases, so that V_{S1} equals V_{S2} . Induced voltage V_{S2} is phase shifted 45 degrees (lag) and V_{S1} shifted 45 degrees (lead) so that output V_{S1} and output V_{S2} are 90 degrees out of phase. The resultant output is the sum of output V_{S1} and output V_{S2} . The net result of advancing the rotor is advancing the resultant output an equal amount in phase.

Since the servo motor drive is linked to the distance indicator, the distance readout will correspond to the amount of phase shift in the 4045.6-Hz signal. The output of the resolver phase shift network is shifted a complete 360 degrees for every 20-mile change on the distance indicator.

2. Adjustments.

Variable resistor R44 is adjusted so that the impedance of R44 and R45 is equal to the impedance of C21. This ensures that the phase shift in the 4045.6-Hz signal properly tracks the rotor movement.

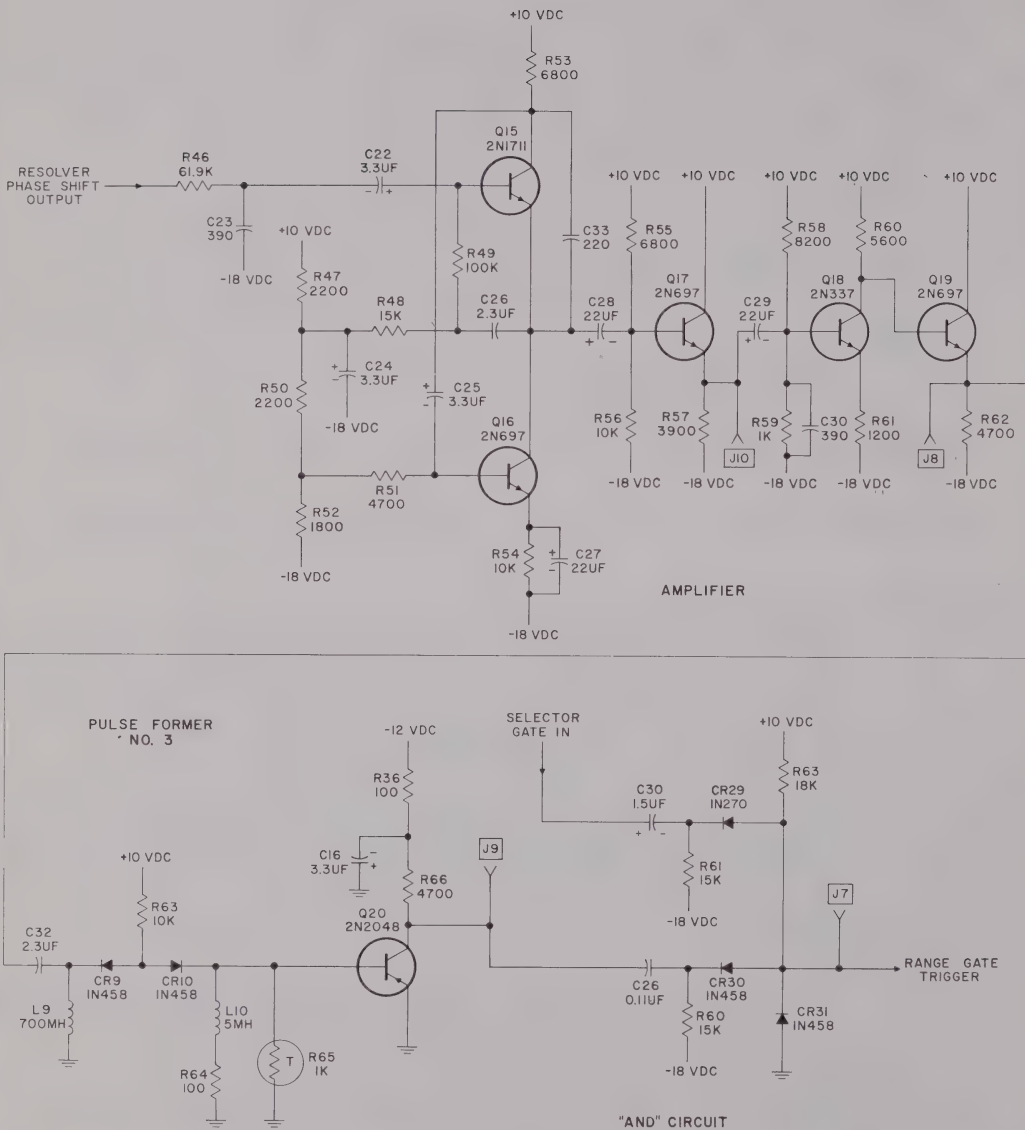
(f) Amplifier Q15 Through Q19. (Refer to figure 53.)

1. Theory.

The resolver phase shift output is applied to the amplifier through a filter consisting of R46 and C23 to reduce harmonic frequency components. The output



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Range Gate Trigger Circuits (P/O Modules A4 and A5), Simplified Schematic Diagram
Figure 53



of the filter is coupled through C22 to the base of Q15. Transistors Q15 and Q16 operate together to form an isolation amplifier. The isolation amplifier presents a high impedance to the phase shifting network so that the phase of the signal is not influenced by a change in the load. Transistor Q15 operates as an emitter follower with Q16 in the emitter circuit of Q15 operating 180 degrees out of phase with the input signal. When the signal applied to the base of Q15 increases in a positive direction, the current through Q15 increases slightly, causing the voltage at the collector of Q15 to decrease. The decrease in the voltage at the collector of Q15 is applied to the base of Q16 through C25. The decrease in voltage at the base of Q16 causes the current through Q16 to decrease. The decrease in current through Q16 offsets the increase in current through Q15 to maintain nearly constant current through Q15. The approximate constant current through Q15 results in a high input impedance since the incremental current drawn by Q15 is small. The input bias network is bootstrapped by C26.

The output of the isolation amplifier is coupled by C28 to emitter follower Q17. The output of Q17 is applied to amplifier Q18 by capacitor C29. Amplifier Q18 provides a voltage gain of 5. The output of Q18 taken at the collector is applied to the base of emitter follower Q19. The output of Q19 is applied to pulse former no. 3.

2. Test Points.

Test points J10 and J8 permit inspection of the shape and phase of the 4045.6-cps signal at two places in the amplifier.

(g) Pulse Former No. 3. (Refer to figure 53.)

1. Theory.

The operation of pulse former no. 3 is the same as pulse former no. 1. See paragraph 6.I.(c)1.

2. Test Points.

Test point J9 permits inspection of the output of pulse former no. 3.

(h) Selector Gate and Pulse Former No. 3 AND-Circuit. (Refer to figure 53.)

1. Theory.

The selector gate and the output of pulse former no. 3 are applied to the cathodes of CR29 and CR30, respectively. When the pulse from pulse former no. 3 is present and selector gate is not present, CR29 and CR31 are forward biased and the voltage at the cathode of CR31 is approximately ground. When CR29 and CR30 are both reverse biased (selector gate and output of pulse former no. 3 both present), the voltage at the cathode of CR31 increases toward +10 volts. This positive pulse is applied to the range gate generator.

2. Test Points.

Test point J7 permits inspection of the range gate trigger.

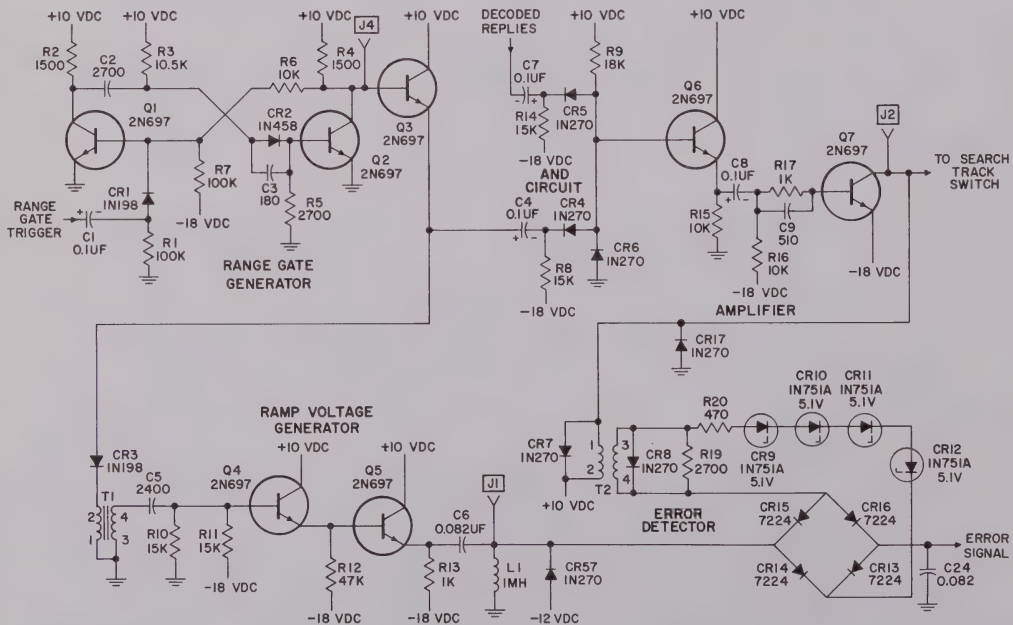


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(i) Range Gate Generator. (Refer to figure 54.)

1. Theory.

With no trigger applied to the range gate generator, transistor Q2 is in saturation. The potential in the collector of Q2, when Q2 is saturated, is approximately ground. The voltage applied to the base of Q1 is then approximately -2 volts. This voltage holds Q1 in cutoff. When the positive trigger is applied through CR1 to the base of Q1, transistor Q1 is forward biased. The voltage at the collector of Q1 then moves from +10 volts toward ground. This negative change is coupled by C2 to the anode of CR2. This removes the forward bias on Q2 and the voltage at the collector of Q2 moves positive. This positive change is coupled to the base of Q1, driving Q1 into saturation. After C2 becomes charged, transistor Q2 is again driven into saturation and the multivibrator returns to its original state. The positive pulse (range gate) taken at the collector of Q2 is coupled through emitter follower Q3 to the AND-circuit and the ramp voltage generator. The range gate is 20 usec long. Emitter follower Q3 prevents any loading from changing the pulse duration.



Error Signal Detection Circuits (P/O Module A6), Simplified Schematic Diagram
Figure 54



2. Test Points.

Test point J4 permits inspection of the range gate and provides a means of monitoring the operation of the range gate.

(j) Range Gate Generator-Decoded Replies AND-Circuit. (Refer to figure 54.)

The decoded replies from the decoder and the range gate generator output (range gate) are applied to the cathodes of diodes CR5 and CR4 through capacitors C7 and C4, respectively. When either or both of the pulses are not present, the voltage at the cathode of CR6 is approximately ground. When the range gate is applied, diode CR4 is reverse biased. Any decoded reply that is applied when CR4 is reverse biased will reverse bias CR5 and CR6 causing the voltage at the cathode of CR6 to increase toward +10 volts. The result is that a positive pulse is applied to Q6 for every decoded reply that is time coincident with a range gate.

(k) Amplifier Q6 and Q7. (Refer to figure 54.)

1. Theory.

The positive pulses from the AND-circuit are applied to the base of emitter follower Q6. The output of Q6 is applied to the base circuit of Q7. Capacitor C9 and resistor R17 in the base circuit of Q7 is a speedup network. Transistor Q7 is forward biased by the pulse producing a negative pulse at the collector of Q7. Diode CR17 is a catching diode that prevents Q7 from saturating. This negative pulse is applied to the search/track switch (see paragraph 6.M.) and is developed in the primary of T2 in the error detector.

2. Test Points.

Test point J2 permits inspection of the output of the AND-circuit and amplifier.

(l) Ramp Voltage Generator. (Refer to figure 54.)

1. Theory.

The positive pulse from the range gate generator is applied through diode CR3 to the primary of transformer T1. Transformer T1 doubles the voltage of the pulse. The output of T1 is differentiated by C5, R10, and R11. The differentiating action results in a pulse with a fast rise time and a sloping top being applied to the base of Q4. Transistors Q4 and Q5 are two emitter followers to prevent any loading from changing the decay time of the differentiating action. This is necessary since the differentiated pulse is the first half of the ramp voltage (see (AA) figure 18) and any change in the time constant would result in a change in the zero crossing point. The output of Q5 is coupled by C6 to the error detector. The positive signal causes C6 and L1 to ring; the negative half cycle fills in the negative portion of the ramp voltage.

2. Test Points.

Test point J1 allows examination of the wave shape of the ramp voltage and the zero crossing point in reference to the range gate.



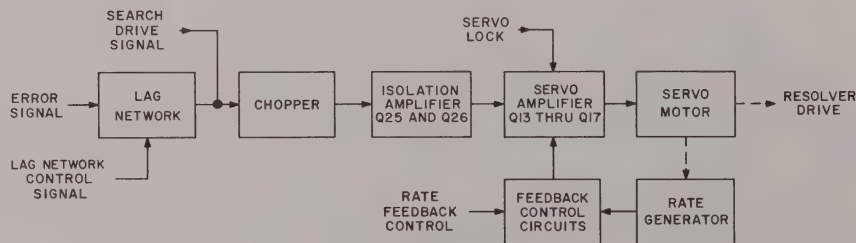
(m) Error Detector. (Refer to figure 54.)

The distance reply pulse from amplifier Q7 is developed in secondary of T2. This negative pulse at the anode of CR8 is large enough to break down diodes CR9, CR10, CR11, and CR12 and forward bias diodes CR13, CR14, CR15, and CR16. The portion of the ramp voltage that is applied to the error detector during this time is passed by conducting diodes CR13 through CR16 to storage capacitor C24, which integrates the pulse signals. This direct voltage is applied to the servo drive circuits as the error signal. The distance reply has no effect on the error signal in that it is isolated from ground by transformer T2. Zener diodes CR9 through CR12 prevent the entire ramp voltage from being applied to the servo drive circuits when the distance reply is absent. The positive portion of the ramp would be applied through CR14, R20, CR8, and CR16 and the negative portion through CR15, CR8, R20, and CR13. Since the ramp voltage is not large enough to breakdown diodes CR9 through CR12, it is blocked from the servo drive circuits.

L. Servo Motor Circuits.

(1) Block Diagram Theory of Operation. (Refer to figure 55.)

The integrated error signal, present during track, from the error detector is applied to the chopper through the lag network. The search drive signal, present during search, is applied to the chopper. The lag network control signal short circuits the capacitor in the lag network during search so that at the time of lock-on there is no charge on the capacitor. The output of the chopper is applied through isolation amplifier Q25 and Q26 to the servo amplifier. The output of the servo amplifier is applied to the servo motor. The servo motor drives the resolver and distance potentiometer in the computing circuits, the synchro transmitter to drive the distance indicator, the rate generator, the optional 12-mile trip switch, the computer potentiometer and the range limit switch. The output of the rate generator is a signal 180 degrees out of phase with the input to the servo amplifier with an amplitude proportional to the speed of rotation. The output of the rate generator is applied through the feedback control circuits to the servo amplifier to prevent oscillations around null during track.



Servo Motor Circuits, Block Diagram
Figure 55



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The feedback control circuits remove the rate feedback during search to increase search speed. The rate feedback is reapplied when the 860E-2 switches from search to track. The servo lock applied to the servo motor locks the servo motor during standby, channeling, the 60-second time delay, and during static memory.

(2) Detailed Theory of Operation.

(a) Lag Network. (Refer to figure 56.)

1. Track Mode.

The error signal, consisting of either a positive or negative d-c voltage (see paragraph 6.K.(3)(m)), is applied to the lag network. The lag network filters noise present on the error signal to prevent indicator jitter. Diodes CR54 and CR55 are limiter diodes to prevent large noise peaks passed by the lag network from being applied to the chopper.

During track the lag network control signal is approximately 0 volt (see paragraph 6.M). Diodes CR44 and CR45 are then not in conduction and the voltage at the gate of Q20 is +10 volts. Transistor Q20 is turned off by this voltage and C25 is not shorted.

2. Memory Mode.

The operation of Q20 during memory is the same as in track mode. The error signal is not present during memory. The charge on capacitor C25 is used to drive the servo motor if the 860E-2 has velocity memory.

3. Search Mode.

During search, the search drive signal is used to drive the strobe either inbound or outbound. To produce inbound drive, the search drive control is a positive d-c voltage. To produce outbound drive, the search drive control is negative. Capacitor C25 in the lag circuit is shorted by Q20 during search so that at the time of lock-on no voltage is stored on the capacitor. The search drive signal can then be removed quickly and the error signal obtained at the beginning of lock-on can control the servo mechanism without being biased by the search drive voltage. The lag network control signal is at approximately -15 volts during search, causing diode CR44 to conduct in the reverse direction and CR45 to conduct in the forward direction. The voltage applied to the gate of Q20 is approximately 0 volt under these conditions. Transistor Q20 is forward biased by this voltage and a short circuit path around C25 is provided. This prevents the search drive signal from charging C25.

4. Prememory Mode.

The search drive signal is removed during prememory and the lag network control signal removes the short across C25. The error signal is present and begins charging C25.



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(b) Isolation Amplifier. (Refer to figure 56.)

1. Theory.

The output of the chopper is applied through C28 and C29 to the base of Q25 in the isolation amplifier. Transistor Q25 operates as an emitter follower with Q26 in the emitter circuit of Q25 operating 180 degrees out of phase with the input signal. The result is a high input impedance and a gain of approximately one. When the signal applied to the base of Q25 increases in a positive direction, the current through Q25 increases slightly, causing the voltage at the collector of Q25 to decrease. The decrease in the voltage at the collector of Q25 is applied to the base of Q26 through C31. The decrease in the voltage at the base of Q26 causes the current through Q26 to decrease. The decrease in current through Q26 offsets the increase in current through Q25 to maintain nearly a constant current through Q25. The approximate constant current through Q25 results in a high input impedance since the incremental current drawn by Q25 is very small. The input bias network is bootstrapped by C30.

The output of the isolation amplifier is applied to the servo amplifier through a 90 degree phase lag network consisting of L1 and C5. The 90 degree phase lag network provides the phase quadrature relationship between the servo motor fixed phase and the output of the servo amplifier. The quadrature relationship is not present without the phase lag circuit since the servo motor fixed phase, rate generator, and chopper excitation are in phase.

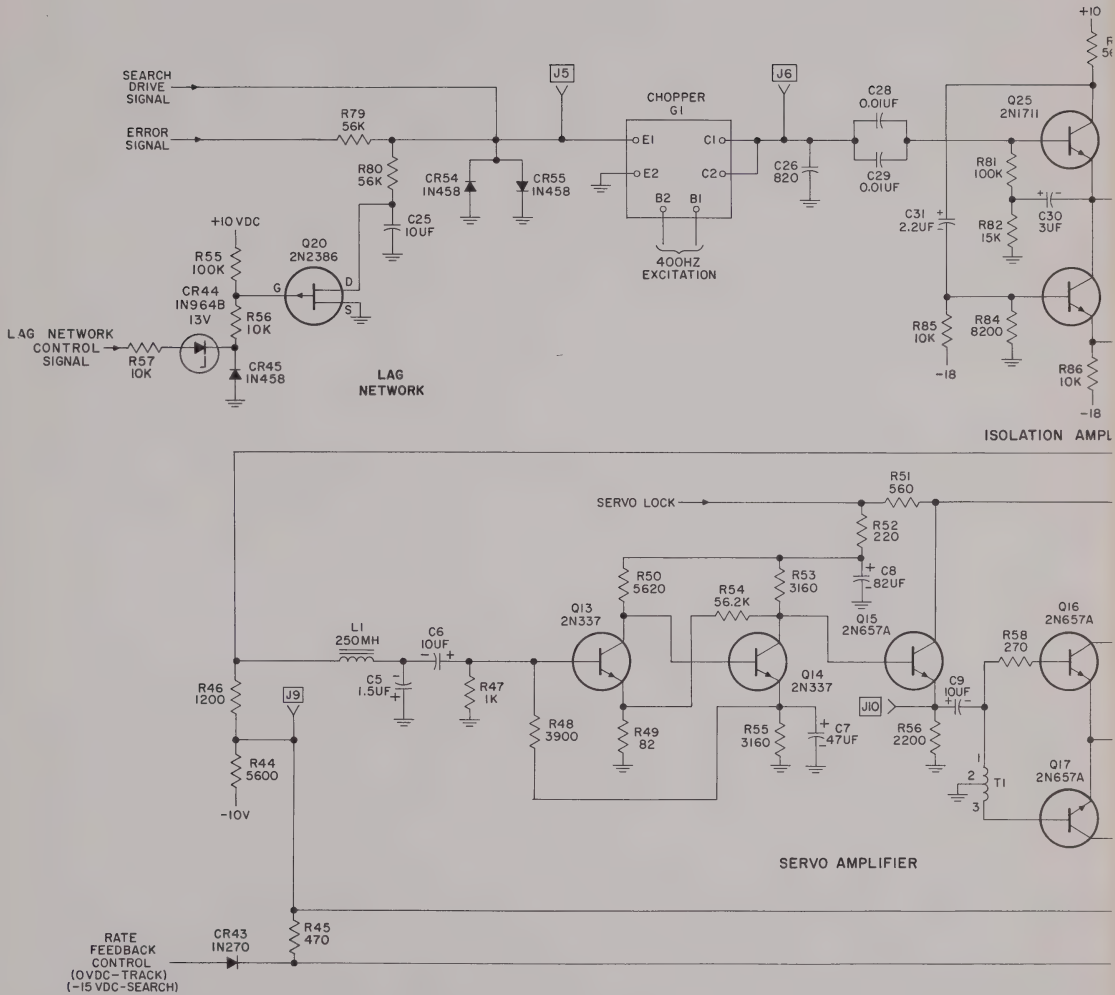
2. Test Points.

Test point J5 permits inspection of the d-c voltage into the chopper. Test point J6 permits inspection of the chopper output. Test point J11 permits inspection of the output of the isolation amplifier.

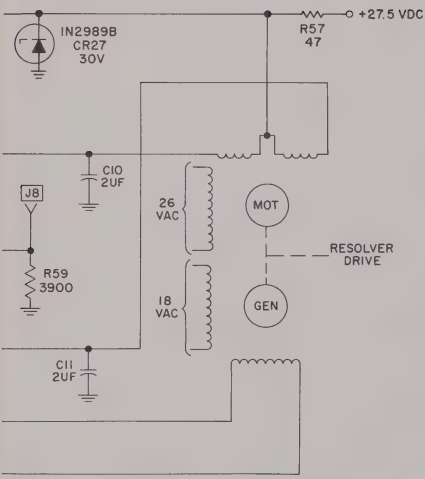
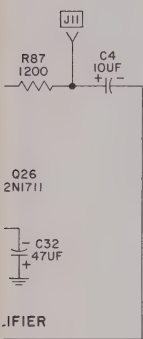
(c) Servo Amplifier. (Refer to figure 56.)

1. Theory.

The phase shifted signal from the isolation amplifier is applied to the base of Q13. The output of transistor amplifier Q13, taken at the collector, is applied to the base of Q14. Resistor R54 provides negative feedback from the collector of Q14 to the emitter of Q13 to stabilize the operating point and gain of Q13 and Q14. Resistor R48 provides negative feedback from the emitter of Q14 to the base of Q13 to stabilize the operating point of the amplifier. The output of Q14 is applied through emitter follower Q15 to a push-pull amplifier consisting of Q16 and Q17. Transformer T1 provides phase inversion to excite the class B output stage. The output of the push-pull amplifier is applied to the servo motor. Capacitors C10 and C11 resonate each half of the center tapped motor windings. The servo lock signal grounds the amplifier power supply and removes excitation from the servo motor to prevent it from rotating during standby, channeling, the 60-second time delay, and during static memory.



Servo-Motor Circuits (P/O Modules A6 and A7), Simplified Schematic Diagram
Figure 56





2. Test Points.

Test point J10 permits inspection of the wave shape and amplitude of the input to the push-pull amplifier. Test J8 permits inspection of the wave shape of the output of the push-pull amplifier.

(d) Rate Feedback Circuits. (Refer to figure 56.)

1. Theory.

The rate generator is driven by the servo motor and produces an output voltage with an amplitude proportional to the speed of rotation. The output of the rate generator is developed across R45. When the 860E-2 is in track mode, the rate feedback control signal applied to the anode of CR43 is ground. Diode CR43 is forward biased under these conditions. The junction of R45 and CR43 is effectively at a-c ground when CR43 is forward biased. The rate generator signal is then developed across R44 and applied through R46 to the servo amplifier.

When the 860E-2 is in search, -15 volts is applied to the anode of CR43. Diode CR43 is reverse biased under these conditions. The rate generator voltage developed across R45 is not developed across R44 because the junction of R45 and CR43 is not grounded.

When the 860E-2 switches from search to track, the voltage at the junction of R44 and R46 goes from -10 volts to approximately -1 volt. This positive change is differentiated by C6 and R47 and applied to the servo amplifier as a positive spike. The positive spike saturates the servo amplifier and places an a-c short across the field windings of the servo motor causing the servo motor to be dynamically braked. Stopping the servo motor prevents it from coasting past lock-on. After the spike has passed, the error signal with the rate signal drives the servo motor. See paragraph 6.M. for a discussion of the rate feedback control.

Diode CR27 protects the circuits utilizing +27.5 volts d-c from being damaged by positive or negative transients appearing on the +27.5-volt line.

2. Test Points.

Test point J9 permits inspection of the rate feedback signal.

M. Search/Track and Memory Circuits.

(1) Block Diagram Theory of Operation. (Refer to figure 57.)

(a) General Operation.

Distance replies from the computing circuits are applied to the blocking oscillator Q8. The blocking oscillator amplifies and reshapes the distance replies and applies them to an integrating network. The time constant of the integrators is controlled by the same signal that controls the prf of the interrogation pulses. The time constant of the integrators is longer when the interrogation rate is low (track) and is shorter when the interrogation rate is high (search).



Figure 56



2. Test Points.

Test point J10 permits inspection of the wave shape and amplitude of the input to the push-pull amplifier. Test J8 permits inspection of the wave shape of the output of the push-pull amplifier.

(d) Rate Feedback Circuits. (Refer to figure 56.)

1. Theory.

The rate generator is driven by the servo motor and produces an output voltage with an amplitude proportional to the speed of rotation. The output of the rate generator is developed across R45. When the 860E-2 is in track mode, the rate feedback control signal applied to the anode of CR43 is ground. Diode CR43 is forward biased under these conditions. The junction of R45 and CR43 is effectively at a-c ground when CR43 is forward biased. The rate generator signal is then developed across R44 and applied through R46 to the servo amplifier.

When the 860E-2 is in search, -15 volts is applied to the anode of CR43. Diode CR43 is reverse biased under these conditions. The rate generator voltage developed across R45 is not developed across R44 because the junction of R45 and CR43 is not grounded.

When the 860E-2 switches from search to track, the voltage at the junction of R44 and R46 goes from -10 volts to approximately -1 volt. This positive change is differentiated by C6 and R47 and applied to the servo amplifier as a positive spike. The positive spike saturates the servo amplifier and places an a-c short across the field windings of the servo motor causing the servo motor to be dynamically braked. Stopping the servo motor prevents it from coasting past lock-on. After the spike has passed, the error signal with the rate signal drives the servo motor. See paragraph 6.M. for a discussion of the rate feedback control.

Diode CR27 protects the circuits utilizing +27.5 volts d-c from being damaged by positive or negative transients appearing on the +27.5-volt line.

2. Test Points.

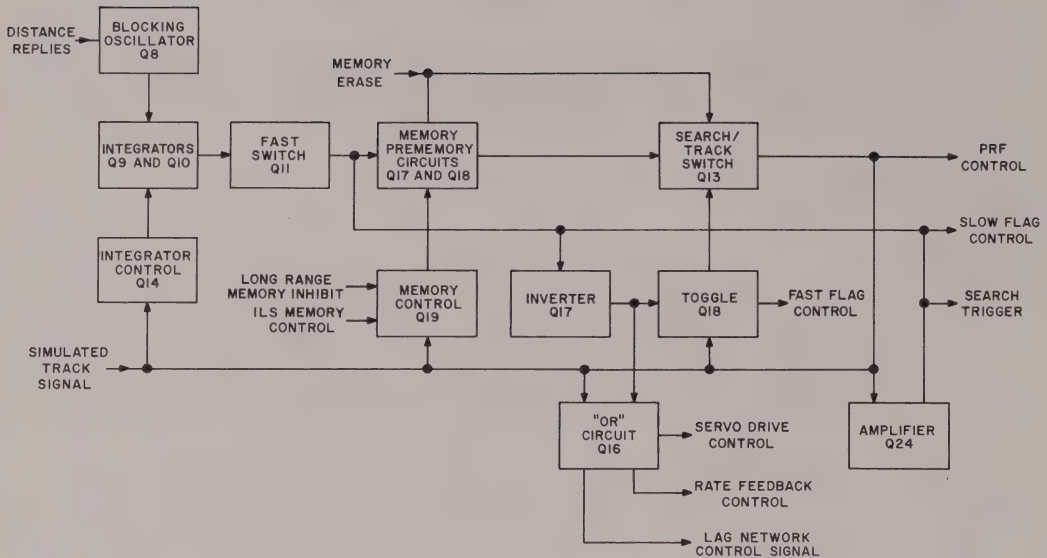
Test point J9 permits inspection of the rate feedback signal.

M. Search/Track and Memory Circuits.

(1) Block Diagram Theory of Operation. (Refer to figure 57.)

(a) General Operation.

Distance replies from the computing circuits are applied to the blocking oscillator Q8. The blocking oscillator amplifies and reshapes the distance replies and applies them to an integrating network. The time constant of the integrators is controlled by the same signal that controls the prf of the interrogation pulses. The time constant of the integrators is longer when the interrogation rate is low (track) and is shorter when the interrogation rate is high (search).



Search/Track and Memory Circuits, Block Diagram
Figure 57

The output of the integrators is applied to the fast switch Q11. The fast switch has two possible outputs; a track output and search output. The fast switch has the track output when the proportion of distance replies to interrogations is above a minimum set level. The fast switch has the search output when the proportion of distance replies to interrogations falls below the minimum level. The output of the fast switch is applied through the memory/prememory circuits, to the search/track switch Q13, to the toggle Q18 and OR-circuit Q16, through an inverting amplifier, and to the search drive circuits and flag circuits as the search trigger and slow flag control, respectively.

The memory/prememory circuits delay the application of the output of the fast switch to the search/track switch. The time lag is either the prememory time or the memory time depending on the mode of operation. If the fast switch changes from search to track the time delay is prememory time. If the fast switch changes from track to search the time is memory time. The search/track switch has either a track or search output and corresponds to the output of the fast switch after the memory or prememory time. The output of the search/track switch is applied to the memory control, to the integrator control, to the toggle, to the interrogation generator as the prf control, to the OR-circuit, and through an inverting amplifier to the search drive circuits as the search trigger and flag control circuits as the slow flag control.



(b) Transition from Search Mode to Track Mode.

When the proportion of distance replies to interrogations becomes large enough, the output of the integrator switches the fast switch from search to track. The memory/prememory circuits delay the application of the track signal from the fast switch to the search/track switch for the prememory time. After the prememory time the fast switch is switched to track. The application of a track signal from the fast switch and the search/track switch to the toggle causes the toggle to close. Under these conditions, the output of the toggle applied to the search/track switch holds the search/track switch in the track position. The track output from the search/track switch lowers the interrogation rate (prf control) and increases the time constant of the integrator.

(c) Transition from Track Mode to Search Mode.

When the proportion of distance replies to interrogations falls below a set minimum the output of the integrator switches the fast switch from track to search. The memory/prememory circuits delay the application of the search signal from the fast switch to the search/track switch for the memory time. This memory time is determined by the inputs to the memory control. The ILS memory control reduces the memory time when the 860E-2 is tuned to an ILS channel.

(2) Detailed Theory of Operation.

(a) General Operation.

1. Blocking Oscillator. (Refer to figure 58.)

The negative distance replies from the computing circuits (see paragraph 6.K.(3)(j)) are applied to the cathode of CR18 in the blocking oscillator. Diode CR18 is forward biased by a negative pulse and current begins to flow in the primary of T3. The increase in current through the primary of T3 results in a positive increase in the voltage at the cathode of CR20. This positive voltage increase forward biases Q8 causing a further increase in the current through the primary of T3. This continues until Q8 is saturated. The field in T3 then collapses and Q8 is cut off. A positive pulse is applied to C13 for each distance reply which is applied to the blocking oscillator.

2. Integrators. (Refer to figure 58.)

With no pulse applied to the integrator from the blocking oscillator, capacitor C13 is charged, to 12 volts, through CR21 and the base emitter junction of Q9. Diode CR21 is forward biased and Q9 is held in saturation by bias applied from R36 or R36 and R37. A positive pulse from the blocking oscillator discharges C13 to approximately 4 volts. Immediately after application of a positive pulse from the blocking oscillator, the emitter of Q8 returns to -12 volts. The voltage at the anode of CR21 is then -8 volts and increases in a positive direction as C13 charges toward 22 volts. Transistor Q9 is cut off until C13 is charged to 12 volts, and CR21 and Q9 are forward biased. The collector of Q9 is at ground potential until a pulse is applied from the blocking oscillator. When a pulse is applied, Q9



collector voltage approaches +10 volts. The time constant of C13 and R36 is long enough to hold Q9 in cutoff during two track interrogation periods. The time constant of C13, R36, and R37 is long enough to hold Q9 in cutoff during two search interrogation periods. The voltage from the collector of Q9 is applied through emitter follower Q10 to an integrating network consisting of R97, R27, R28, R39, and C15. A positive voltage is applied to the integrating network when Q9 is cut off. The positive integrated voltage is applied to the base of the fast switch Q11. The time constant of the integrator establishes a positive voltage from Q10 of approximately 50-millisecond duration to switch Q11. This time corresponds to seven consecutive reply pulses at the search prf with 100-percent reply efficiency. The integrator prevents false lock-on that could result from random interception of squitter pulses during the search cycle.

3. Fast Switch. (Refer to figure 58.)

When the voltage applied to the base of Q11 is negative, the voltage at the collector of Q11 is approximately +8 volts. This is the search condition of the fast switch. When the voltage applied to the base of Q11 is high enough to forward bias Q11, the voltage at the collector decreases to ground potential. The track condition in Q11 is saturation.

4. Search/Track Switch. (Refer to figure 58.)

Approximately +1 volt or more at the anode of CR28 will cause the search/track switch, Q13, to be cut off. When Q13 is cut off it is in the search condition and the voltage at the collector of Q13 is -15 volts. A voltage less positive than +1 volt at the anode of CR28 drives Q13 into saturation. When Q13 is saturated, it is in the track condition and the voltage at the collector of Q13 is zero.

During search, the voltage at the collector of fast switch Q11 is +8 volts, resulting in a CR28 anode voltage of approximately +3 volts. At the time of lockon, ground is applied through Q11 and the voltage at the anode of CR28 decreases slowly as C17 discharges. (Capacitor C18 is switched out of the circuit. See paragraph 6.M.(2)(a)8.). The time required for the voltage at CR28 to reach +1 volt is the prememory time. Resistor R95 and CR27 provide an additional discharge path for C17 during prememory, since CR27 is conducting.

5. Toggle. (Refer to figure 58.)

Toggle transistor Q18 is cut off during search and memory and saturated during track. Transistor W18 is controlled by the voltage at the collector of search/track switch Q13 and the cathode of CR40. When the voltage at the cathode of CR40 is more positive than -10 volts and the collector of Q13 is at ground potential, transistor Q18 is turned on. When either one of the conditions above is not present, Q18 is off. During search, when fast switch Q11 is cut off, a positive voltage is applied to the base of Q17. Transistor Q17 is held in cutoff, and its collector is at approximately -15 volts. Diodes CR39 and CR40 are forward biased by the -15 volts, causing the



voltage at the base of Q18 to be more negative than -10 volts, holding transistor Q18 in cutoff. At the beginning of prememory, immediately after Q11 switches on, the base of Q17 is at a negative voltage and Q17 is saturated. The voltage at the collector of Q17 is zero volt and C19 charges through R47. The time constant of R47 and C19 is such that the voltage at the cathode of CR40 is more positive than -10 volts before the end of prememory time. At the end of prememory time, search/track switch Q13 saturates and the collector of Q13 is at zero volt. The base of Q18 is then more positive than -10 volts and Q18 is saturated. Capacitor C17 is quickly discharged through R34 and Q18 and the voltage at the anode of CR28 is -10 volts. After Q18 is saturated, the toggle action is accomplished and lock-on is completed.

The fast flag control (see paragraph 6.P.) is taken from the collector of Q18 and is +10 volts through R98 during search and memory and -2 volts during track.

6. Memory. (Refer to figure 58.)

If distance reply pulses are lost after Q13 saturates (during track), transistors Q11 and Q17 are cut off. Capacitor C19 discharges rapidly through CR39 and R46, and Q18 is cut off. Capacitor C17, or C17 and C18, charge and the voltage at the anode of CR28 increases in a positive direction from -10 volts. The time required for the voltage at the anode of CR28 to reach +1 volt is the memory time. Capacitor C18 is not active on ILS channels in order to produce a shorter memory time on ILS channels than on the other channels when C18 is in the circuit. When the anode of CR28 reaches +1 volt, Q13 is cut off and search is initiated. Diode CR25 is forward biased during memory since the collector of Q11 is at +8 volts and the cathode of CR25 is at 0 volt. Resistor R94 then affects the memory time. Resistor R94 does not affect prememory since CR25 is reverse biased by +6 volts at the cathode of CR25 during prememory.

When the modulator is turned off, a positive voltage is applied as memory erase (see paragraph 6.O.). If the 860E-2 is in track when memory erase is applied, the memory erase signal fully charges C17 to erase memory. Capacitor C18 is switched out of the circuit during channeling since the long range memory inhibit cuts off Q19 (see paragraph 6.M.(2)(c)8.). If the DME is in search when memory erase is applied, the memory erase has no effect.

7. Distance Reply Integrator Control. (Refer to figure 58.)

When search/track switch Q13 is in track condition, ground is applied to R38, and Q14 is in saturation. When Q14 is in saturation, approximately -10 volts is applied to the anode of CR31. Diode CR31 is reverse biased and R37 is removed from the integrating circuit. When the search/track switch is in search condition, -15 volts is applied to R38, and Q14 is cut off. When Q14 is cut off, CR31 conducts and R37 is in parallel with R36.

8. Memory Control. (Refer to figure 58.)

When transistor Q19 is saturated, diodes CR41 and CR42 are forward biased and C18 is effectively in parallel with C17.



The charge and discharge time of the memory/prememory circuits is then maximum. When transistor Q9 is cut off, diode CR42 is reverse biased and C18 is effectively removed from the memory/prememory circuit. Capacitor C18 cannot be charged through CR41, and if C18 cannot be charged to 13 volts, it cannot be active during memory or prememory. The charge and discharge time of the memory/prememory circuits under these conditions is minimum.

When search/track switch Q13 is in the search condition, -15 volts is applied to the base of Q19 through CR23. Transistor Q19 is cut off and C18 is removed from the circuit. Capacitor C17 controls the prememory time since C18 is out of the circuit at the time of lock on.

When the search/track switch Q13 is in the track condition, the -15 volts is not present at the cathode of CR23 and the condition of Q19 is a function of the ILS memory control. For short memory on ILS channels, the ILS control is at a voltage more negative than -12 volts and Q19 is cut off. For long memory on other channels, the ILS control is at ground and Q19 is saturated.

The long range memory inhibit (see paragraph 6.O.) is at -18 volts when the modulator is turned off. This voltage prevents C18 from being charged by the memory erase. If C18 were to charge to 13 volts prior to lock-on, the pre-memory time would be increased since C18 could discharge through CR41 during prememory even though Q19 is cut off.

9. Amplifier OR-Circuit. (Refer to figure 58.)

The collector voltage of the search/track switch Q13 is applied to the base of Q15 through dividers R41 and R42. The resulting voltage at the base of Q15 is -1.5 volts during search and +5.5 volts during track. These voltages are applied through emitter follower Q15 to the prf control. The output of Q15 is also applied to inverter Q24 to produce a voltage at the collector of Q24 of +7 volts during search and 0 volt during track.

Emitter follower Q16 is driven by OR-diodes CR36 and CR37. During search the collector voltages of Q13 and Q17 are -15 volts. Emitter follower Q16 then applies -15 volts to the lag network control and the rate feedback control. The servo drive control is disconnected by CR34 and CR35. The emitter of Q16 is held at zero volt by CR36 during memory and CR36 and CR37 during track.

(b) Sequential Operation.

1. Search Mode. (Refer to figure 58.)

During search the number of distance replies applied to the blocking oscillator is low since they consist only of squitter pulses that happen to be time coincident with the range gate. Transistor Q9 is in cutoff for only short periods of time under these conditions. Capacitor C15 does not charge sufficiently to turn on the fast switch, Q11. Capacitor C17 is charged to approximately 13 volts. This positive voltage, +3 volts with respect to ground at the anode of CR28, is applied through Q12 to hold Q13 in cutoff. With Q13 in cutoff, -15 volts is applied



through R41 and R42 to emitter follower Q15 to the prf multivibrator to provide the high prf for search. The negative output from Q15, -1.5 volts, is applied to the base of Q24 to cut off Q24. The output of Q24 is the slow flag control and the search trigger. For a complete discussion of these outputs see paragraphs 6.P. and 6.N., respectively. The -15 volts from the search/track switch is also applied through CR34 to the servo drive control and through CR36 and emitter follower Q16 to the lag network control and the rate feedback control. These signals apply the search voltage to the servo motor, cause the lag network to be short circuited, and disconnect the rate feedback. Transistor Q19 is cut off by the -15 volts from the search/track switch through CR23. This removes C18 from the memory/prememory circuits. Transistor Q14 is also cut off by the -15 volts from the search/track switch. This places R37 in the integrator so the time constant is minimum. Toggle Q18 is held in cut off by the -15 volts through R96.

2. Transition from Search Mode to Track Mode. (Refer to figure 58.)

When the range gate is time coincident with the ground station reply pulse, there is a sharp increase in the number of pulses applied to the blocking oscillator. Capacitors C13 and C14 do not become fully charged under these conditions causing Q9 to be cut off. Emitter follower Q16 applies the positive voltage at the collector of Q19 to the integrator and C15 is charged. Fast switch Q11 is then in saturation and the collector of the fast switch changes from +8 volts to ground. Capacitor C17 begins to discharge when Q11 switches. When C17 has discharged to provide +1 volt at the anode of CR28, transistor Q13 is turned on and the collector of the search/track switch is at ground. The time that it takes C17 to discharge to the level required to turn Q13 on is the prememory time.

During the prememory period, after fast switch Q11 has switched to track (saturated) and before the search/track has switched to track (saturated), transistor Q17 is turned on. The voltage at the collector of Q17 rises from -15 volts to 0 volt. Capacitor C19 charges through R47 and the voltage at the cathode of CR40 rises from -15 volts toward ground. Transistor Q18 is not turned on by this voltage because of the -15 volts from the search/track switch through R96. Ground is also applied through CR37 to the base of emitter follower Q16 during this time. Zero volt is then applied to the lag network control (see paragraph 6.L.), to the rate feed back control (see paragraph 6.L.), and through CR35 to the servo drive control (see paragraph 6.N.). The lag network is unshorted, rate feedback is applied and the servo drive voltage is removed.

After the prememory period (track), transistor Q13 is turned on and the collector of Q13 is at ground. This ground is applied through R96 to the base of Q18 and, along with the ground from Q17, turn the toggle on. When toggle Q18 is on, C17 is rapidly discharged. The ground from the search track switch is applied through R41 and R42 and emitter follower Q15 to the prf control (see paragraph 6.I.) and to the base of Q24. The prf is reduced to the track rate. Transistor Q24 is saturated and +6 volts is applied to the slow flag control (see paragraph 6.P.). The ground from the search/track switch is also applied to the base of



Q14 and to the base of Q19. Transistor Q14 is turned on and the time constant of the integrator is increased. Transistor Q19 is turned on unless prevented from doing so by the ILS memory control. When Q19 does saturate, C18 is in the circuit to produce long memory.

3. Transition from Track Mode to Search Mode. (Refer to figure 58.)

When the output of the blocking oscillator falls below the rate required to keep C13 and C14 discharged, diode CR21 becomes forward biased and transistor Q9 is turned on. The emitter of Q10 decreases to 0 volt and C15 discharges. Fast switch Q11 is cut off after C15 is discharged. The cutoff state is the search position of the fast switch. The collector of Q11 is at +8 volts when Q11 is cut off. Transistor Q17 is cut off and its collector voltage increases to -15 volts. Capacitor C19 is discharged rapidly through CR39 and R46. When the cathode of CR40 becomes more negative than -10 volts Q18 is cut off. Capacitors C17 with short memory or C17 and C18 with long memory begin to charge. After C17 or C17 and C18 have charged so that the anode of CR28 is at +1 volt, the search/track switch, Q13, is cut off. This is the search position of the search/track switch. The time it takes to charge C17 and C18 to the level required to cut off Q13 is the memory time.

During memory, the search/track switch output is ground so the slow flag control, the search trigger, the prf control, the servo drive control, the rate feedback control and the lag network control have the same outputs that they had during track. The fast flag control charges from approximately -2 volts to +10 volts when the fast switch changes from track to search. This function, when activated, causes the flag to cover during the memory period.

After the memory period (C17 and C18 charged) the collector of the search/track switch, Q13, changes to -15 volts. The circuit is then in the search condition.

(c) Test Points.

Test point J3 permits inspection of the pulses into the integrator. Test point J7 permits inspection of the input to the fast switch. Test point J8 permits inspection of the OR-circuit output. Test point J9 permits inspection of the output of the fast switch. Test point J11 permits inspection of the position of the prf control voltage.

N. Search Drive Circuits.

(1) General.

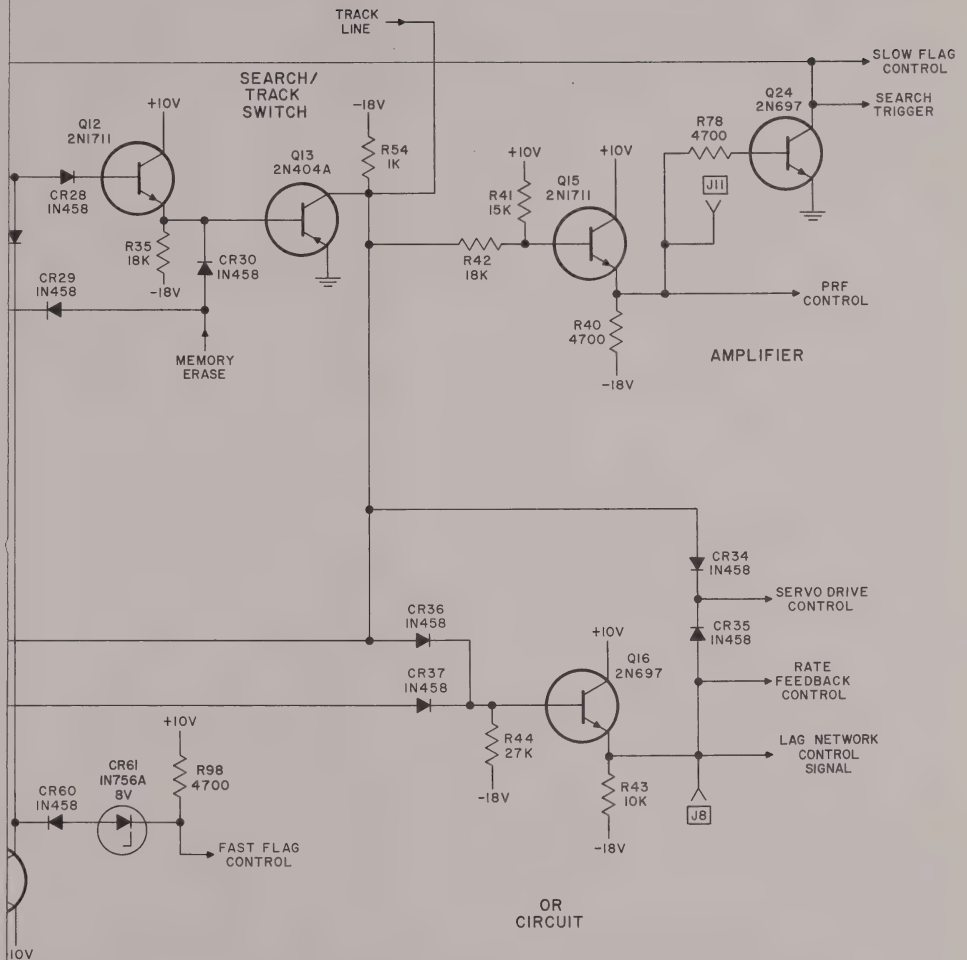
The search drive circuits provide a signal to the chopper in the servo motor drive circuits to drive the servo motor during search. The output of the search drive circuits is a negative d-c voltage to produce outbound search and a positive d-c voltage to produce inbound slew. During track the servo drive circuits have no useful output.

(2) Block Diagram Theory of Operation. (Refer to figure 59.)

NOTE: The following discussion assumes the range limit switch is set at 50 miles. It may be set at any distance between 10 and 70 miles.



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Search/Track and Memory Circuits (P/O Module A6), Simplified Schematic Diagram
Figure 58



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Q14 and to the base of Q19. Transistor Q14 is turned on and the time constant of the integrator is increased. Transistor Q19 is turned on unless prevented from doing so by the ILS memory control. When Q19 does saturate, C18 is in the circuit to produce long memory.

3. Transition from Track Mode to Search Mode. (Refer to figure 58.)

When the output of the blocking oscillator falls below the rate required to keep C13 and C14 discharged, diode CR21 becomes forward biased and transistor Q9 is turned on. The emitter of Q10 decreases to 0 volt and C15 discharges. Fast switch Q11 is cut off after C15 is discharged. The cutoff state is the search position of the fast switch. The collector of Q11 is at +8 volts when Q11 is cut off. Transistor Q17 is cut off and its collector voltage increases to -15 volts. Capacitor C19 is discharged rapidly through CR39 and R46. When the cathode of CR40 becomes more negative than -10 volts Q18 is cut off. Capacitors C17 with short memory or C17 and C18 with long memory begin to charge. After C17 or C17 and C18 have charged so that the anode of CR28 is at +1 volt, the search/track switch, Q13, is cut off. This is the search position of the search/track switch. The time it takes to charge C17 and C18 to the level required to cut off Q13 is the memory time.

During memory, the search/track switch output is ground so the slow flag control, the search trigger, the prf control, the servo drive control, the rate feedback control and the lag network control have the same outputs that they had during track. The fast flag control charges from approximately -2 volts to +10 volts when the fast switch changes from track to search. This function, when activated, causes the flag to cover during the memory period.

After the memory period (C17 and C18 charged) the collector of the search/track switch, Q13, changes to -15 volts. The circuit is then in the search condition.

(c) Test Points.

Test point J3 permits inspection of the pulses into the integrator. Test point J7 permits inspection of the input to the fast switch. Test point J8 permits inspection of the OR-circuit output. Test point J9 permits inspection of the output of the fast switch. Test point J11 permits inspection of the position of the prf control voltage.

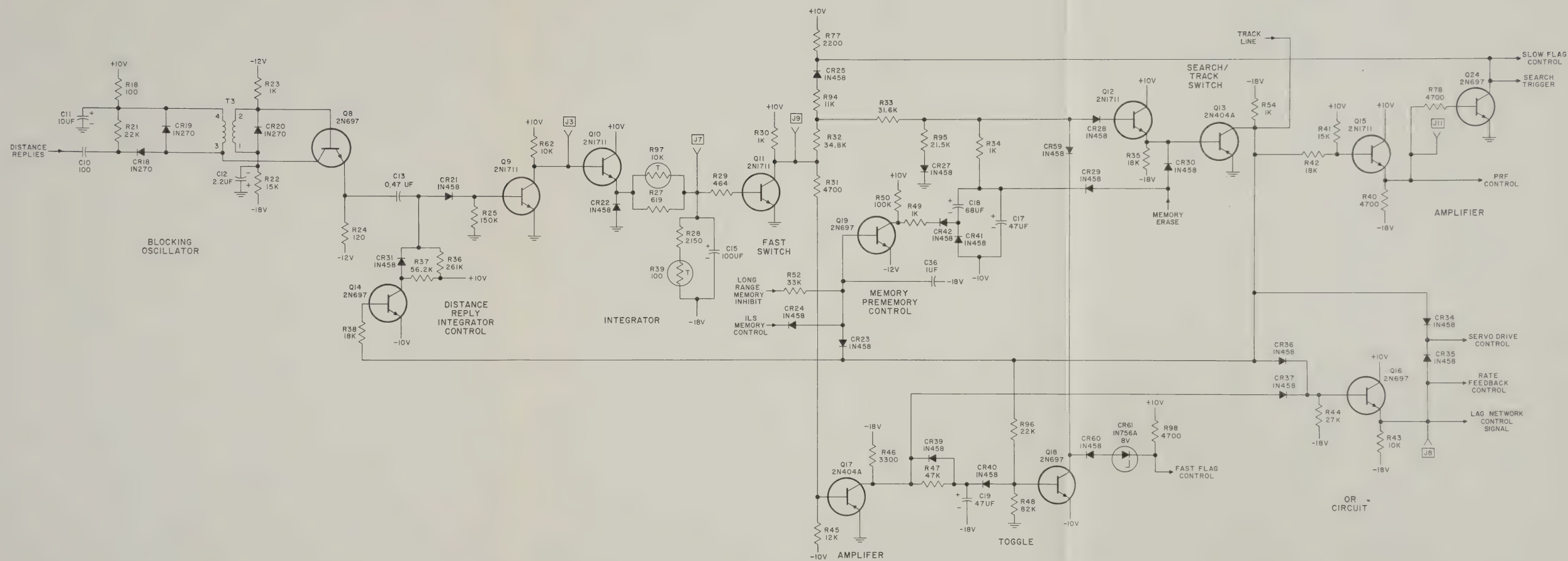
N. Search Drive Circuits.

(1) General.

The search drive circuits provide a signal to the chopper in the servo motor drive circuits to drive the servo motor during search. The output of the search drive circuits is a negative d-c voltage to produce outbound search and a positive d-c voltage to produce inbound slew. During track the servo drive circuits have no useful output.

(2) Block Diagram Theory of Operation. (Refer to figure 59.)

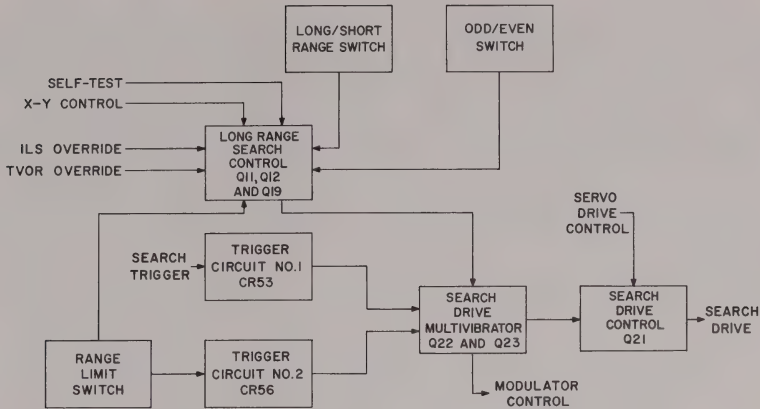
NOTE: The following discussion assumes the range limit switch is set at 50 miles. It may be set at any distance between 10 and 70 miles.



Search/Track and Memory Circuits (P/O Module A6), Simplified Schematic Diagram
Figure 58



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Search Drive Circuits, Block Diagram
Figure 59

Search drive multivibrator Q22 and Q23 is a bistable multivibrator with either a positive or negative output depending on its state. The positive or negative voltage is applied to the search drive control Q21. The servo drive control signal from the search/track switch (see paragraph 6.M.) applies the output of the search drive multivibrator to the chopper as the search drive.

The state of the search drive multivibrator is determined by the inputs from trigger circuits no. 1 and no. 2 and the long range search control. A trigger is applied to the multivibrator from trigger circuit no. 2 at 0 mile and 50 miles; these triggers change the state of the multivibrator. This causes the 860E-2 to search from 0 to 50 miles, reverse, slew to zero and search from 0 to 50 miles. The modulator control turns off the modulator during inbound slew. To search beyond the 50-mile range limit, the trigger from trigger circuit no. 2 must be overridden by a signal from the long range search control. The signal from the long range search control, to allow long range search, is present under the conditions listed in figure 60.

RANGE SWITCH	X-Y CONTROL	ILS OVERRIDE	TVOR OVERRIDE	ODD/EVEN SWITCH
Long Range	either	either	either	either
Short Range	X	override	override	even
Short Range	X	either	override	odd
Short Range	Y	either	override	either

Table of Conditions to Obtain Long Range Search
Figure 60



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A trigger is applied to the search drive multivibrator from trigger circuit no. 1 when the search/track switch changes from track to search. Trigger circuit no. 1 does not have a trigger output when the search/track switch changes from search to track. The trigger changes the state of the multivibrator if it is in the outbound condition. This results in inbound slew if the distance indication is between 0 and 50 miles after memory, manual standby or standby as a result of signal controlled search, channeling, and the 60-second time delay. During manual standby or standby as a result of signal controlled search, channeling, and the 60-second time delay, the search/track switch is placed in the simulated track condition to lower the prf. See paragraph 6.P.). Therefore, when the 860E-2 changes from one of these conditions to search, the input to trigger circuit no. 1 is the same as the switch from track to search. If the distance indication is between 50 and 200 miles, the trigger from trigger circuit no. 1 is overridden by the long range search control except when the 860E-2 is channeled to a short range channel from a long range channel or the 860E-2 is on a short range channel and is switched from overridden to not overridden. The result is that outbound search follows memory, manual standby or standby as a result of signal controlled search, channeling, and the 60-second time delay, when the distance indication is above 50 miles with the exceptions noted above.

The self-test signal into the long range search control removes the long range search control signal during self-test. The long range search control signal is present when the distance indication is between 50 and 200 miles. This causes the 860E-2 to slew inbound when beginning self test (see paragraph 6.R.) from any distance indications.

(3) Detailed Theory of Operation.

(a) Search Drive Multivibrator. (Refer to figure 61.)

The search drive multivibrator Q22 and Q23 is a bistable multivibrator. The output from the multivibrator taken at the collector of Q22 is applied to the servo drive control and determines the direction of search. The output taken at the collector of Q23 is applied to the modulator control/standby circuits and turns off the modulator during inbound slew. If transistor Q22 is cut off, slew is inbound with modulator off. If transistor Q22 is in saturation the search is outbound with modulator on.

Trigger circuit no. 1 applies a negative trigger to the collector of Q23 when the 860E-2 switches from track to search. The search trigger applied to the gate of CR53 changes from a negative voltage to a positive voltage when the search/track switch changes from track to search. During track, CR53 is held cutoff and C23 charges to +10 volts. When the search trigger goes positive, CR53 fires. Capacitor C23 discharges causing a sharp negative change in the voltage at the anode of CR53. This negative change is applied through C22 and CR32 to the collector of Q23. If the multivibrator is in the outbound state (Q22 on), the negative trigger reverse biases Q22 causing the multivibrator to change states. If the multivibrator is in the inbound state (Q22 off), the negative trigger has no effect. If the 860E-2 is tuned to a long range channel or an overridden short range channel, a voltage more positive than -10 volts is applied to the multivibrator on the long range search wire (see paragraph 6.N.(3)(b)) and the negative trigger is overridden. The result of the search trigger is that the indicator initially slews inbound if the 860E-2 switches from track to search when the distance indication is below 50 miles.



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Trigger circuit no. 2 applies a negative trigger to the collectors of Q22 and Q23 at 50 miles and 0 mile. The range limit switch, connected to the junction of R91 and R92, is open over the 0- to 50-mile interval and closed over the 50- to 200-mile interval. A negative voltage is applied to the gate of CR56 over the 0- to 50-mile interval and C34 charges to +10 volts. When the search reaches 50 miles in an outbound direction or 0 mile in an inbound direction the range limit switch closes and a positive voltage is applied to the gate of CR56. Silicon controlled rectifier CR56 fires and C34 discharges. The negative change in the voltage at the anode of CR56 is applied through C33 and CR50 or CR52 to the collectors of Q22 or Q23 and causes the multivibrator to change modes. To obtain search beyond 50 miles, the negative spike must be overridden by a voltage more positive than -10 volts on the long range search wire. (See paragraph 6.N.(3)(b).)

When zero mile is reached in the inbound direction, even though the trigger from CR56 reverses the search drive multivibrator, the indicator coasts slightly past zero because of the inertia of the distance mechanism. The indicator is then in the 50- to 200-mile interval and Q12 is cut off (see paragraph 6.N.(3)(b)). If the 860E-2 is operating on a nonoverridden short range channel, Q19 is also cut off. The cathode of CR19 is driven toward -18 volts through R40. If C3 were not present, the negative excursion at CR19 would drive Q22 to cut off and place the search drive multivibrator in the inbound condition causing the indicator to continue inbound. Capacitor C3 prevents a fast negative change at the cathode of CR19 and allows time for the indicator to stop, reverse, and accelerate in the outbound direction. After the indicator has reversed and is in the 0- to 50-mile interval, Q12 is saturated and the voltage at the cathode of CR19 is rapidly driven to zero through CR24.

(b) Long Range Search Control. (Refer to figure 61.)

1. General.

To achieve search beyond 50 miles a voltage more positive than -10 volts must be applied to the long range search wire to override the trigger from trigger circuit no. 2 and hold the search drive multivibrator in the outbound position (Q22 cutoff). This voltage is provided at the collector of Q19, when Q19 is in saturation, and is +3 volts. When Q19 is cut off, the collector of Q19 is at -18 volts and Q19 does not control the search drive multivibrator. Transistor Q11 operates as a diverter on Q19 so that when Q19 is saturated, Q22 is cut off only if Q11 is also saturated. When Q11 is cut off, the voltage at the anode of CR17 is held more negative than -10 volts by R33 connected to -18 volts. The voltage at the anode of CR17 is then more negative than -10 volts and independent of the condition of Q19.

2. ILS Channels.

ILS channels are all even numbered X channels from channel 18 through 56 inclusively. When the 860E-2 is tuned to an ILS channel, the long/short range switch is open and the odd/even switch is open. The X-Y control is at approximately +5 volts when the 860E-2 is tuned to an X channel.



Transistor Q11 is off when the 860E-2 is tuned to an ILS channel, since both the long/short range switch and the odd/even switch are open and the X-Y control is positive. The +10 volts applied through R32 holds Q11 in cutoff. When Q11 is cut off and ILS channels are not overridden, -18 volts is applied to the cathode of CR14. When 50 miles is reached in the search cycle, a positive voltage is applied to the base of Q12 by divider R90 and R91. Transistor Q12 is then cut off and -18 volts is applied through R42 and R41 to the cathode of CR23. The voltage at the base of Q19 under these conditions is approximately +6 volts when CR33 is not grounded due to the +10 volts through R39 and through R38 and CR23. Transistor Q19 is held in cutoff by this voltage and -18 volts is applied through R35 and R36 to the anodes of CR14 and CR17. The voltage needed to provide long range search is not present because Q19 and Q11 are cut off and the indicator moves between 0 and 50 miles.

When CR33 is grounded and CR34 is not grounded, Q12 is cut off at 50 miles as described above. However when the anode of CR33 is grounded, Q20 is driven into saturation by divider R65 and R66 connected to +10 volts. When Q20 is saturated, diode CR21 is forward biased by the +10 volts through R38 and the anode of CR21 is approximately at ground. The voltage at the base of Q19 applied through R42, R41, and R39 and clamped by CR23 to ground saturates Q19. The collector of Q19 is at +3 volts but Q11 is cut off, as described above, and the voltage at the anode of CR17 is more negative than -10 volts. The long range search control is therefore not active and the indicator moves from 0 to 50 miles.

When ILS channels are overridden, ground is applied to the anode of CR34. The anode of CR33 must also be grounded since the ILS override cannot be overridden unless the TVOR override is also overridden. When the anode of CR33 is grounded, the anode of CR23 is approximately at ground. The voltage applied to the base of Q19 is approximately ground. Transistor Q19 is saturated under these conditions resulting in approximately +3 volts at the collector of Q19. The ground applied to the anode of CR34, when ILS channels are overridden, holds the cathode of CR14 at ground. The +3 volts at the collector of Q19 is clamped to ground by CR14 through R35 and applied through CR17 to the search drive multivibrator to provide long range search.

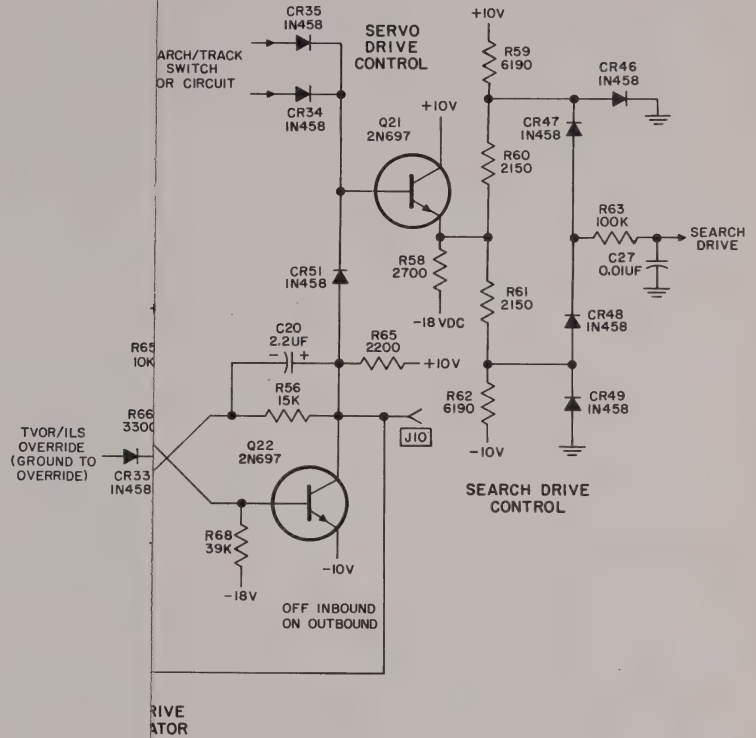
3. TVOR Channels.

TVOR channels are all Y channels from 17 through 56 inclusively and all odd numbered X channels from 17 through 55 inclusively.

Transistor Q11 is saturated when the 860E-2 is tuned to a TVOR channel since either the odd/even switch is closed or the X-Y control is at -3 volts (Y channel). When the odd/even switch is closed, -18 volts is applied through R30 and CR15 to the base of Q11 to saturate it. When the X-Y control is at -3 volts, the voltage at the base of Q11 is negative and Q11 is saturated. When Q11 is saturated, the cathode of CR14 is approximately at ground. When 50 miles is reached in the search cycle, a positive voltage is applied to the base of Q12 by divider R90 and R91. Transistor Q12 is then cut off and -18 volts is applied through R42 and R41 to the cathode of CR23. The voltage at the base of Q19

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Search Drive Circuits (P/O Modules A6 and A7), Simplified Schematic Diagram
Figure 61



Transistor Q11 is off when the 860E-2 is tuned to an ILS channel, since both the long/short range switch and the odd/even switch are open and the X-Y control is positive. The +10 volts applied through R32 holds Q11 in cutoff. When Q11 is cut off and ILS channels are not overridden, -18 volts is applied to the cathode of CR14. When 50 miles is reached in the search cycle, a positive voltage is applied to the base of Q12 by divider R90 and R91. Transistor Q12 is then cut off and -18 volts is applied through R42 and R41 to the cathode of CR23. The voltage at the base of Q19 under these conditions is approximately +6 volts when CR33 is not grounded due to the +10 volts through R39 and through R38 and CR23. Transistor Q19 is held in cutoff by this voltage and -18 volts is applied through R35 and R36 to the anodes of CR14 and CR17. The voltage needed to provide long range search is not present because Q19 and Q11 are cut off and the indicator moves between 0 and 50 miles.

When CR33 is grounded and CR34 is not grounded, Q12 is cut off at 50 miles as described above. However when the anode of CR33 is grounded, Q20 is driven into saturation by divider R65 and R66 connected to +10 volts. When Q20 is saturated, diode CR21 is forward biased by the +10 volts through R38 and the anode of CR21 is approximately at ground. The voltage at the base of Q19 applied through R42, R41, and R39 and clamped by CR23 to ground saturates Q19. The collector of Q19 is at +3 volts but Q11 is cut off, as described above, and the voltage at the anode of CR17 is more negative than -10 volts. The long range search control is therefore not active and the indicator moves from 0 to 50 miles.

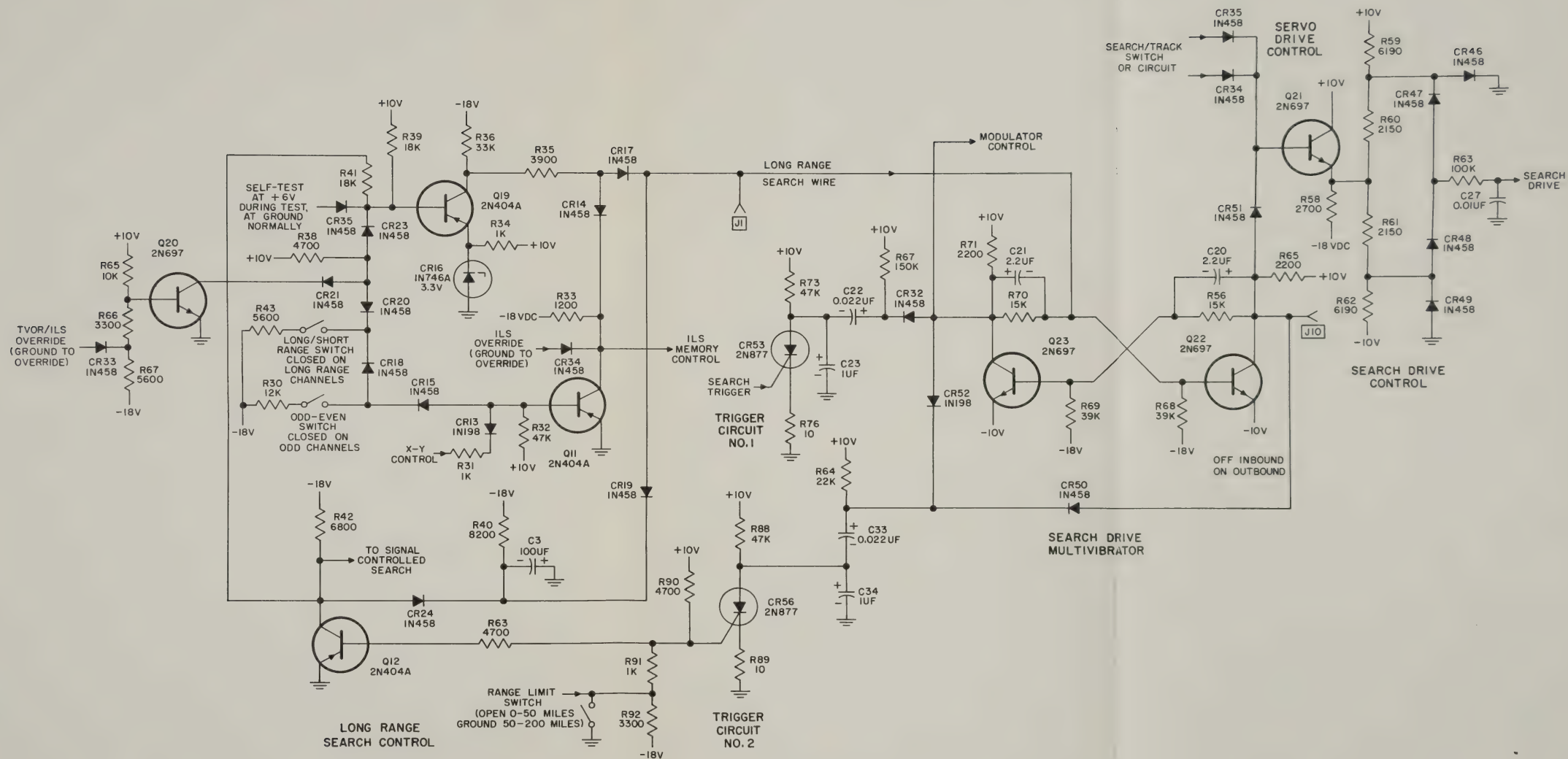
When ILS channels are overridden, ground is applied to the anode of CR34. The anode of CR33 must also be grounded since the ILS override cannot be overridden unless the TVOR override is also overridden. When the anode of CR33 is grounded, the anode of CR23 is approximately at ground. The voltage applied to the base of Q19 is approximately ground. Transistor Q19 is saturated under these conditions resulting in approximately +3 volts at the collector of Q19. The ground applied to the anode of CR34, when ILS channels are overridden, holds the cathode of CR14 at ground. The +3 volts at the collector of Q19 is clamped to ground by CR14 through R35 and applied through CR17 to the search drive multivibrator to provide long range search.

3. TVOR Channels.

TVOR channels are all Y channels from 17 through 56 inclusively and all odd numbered X channels from 17 through 55 inclusively.

Transistor Q11 is saturated when the 860E-2 is tuned to a TVOR channel since either the odd/even switch is closed or the X-Y control is at -3 volts (Y channel). When the odd/even switch is closed, -18 volts is applied through R30 and CR15 to the base of Q11 to saturate it. When the X-Y control is at -3 volts, the voltage at the base of Q11 is negative and Q11 is saturated. When Q11 is saturated, the cathode of CR14 is approximately at ground. When 50 miles is reached in the search cycle, a positive voltage is applied to the base of Q12 by divider R90 and R91. Transistor Q12 is then cut off and -18 volts is applied through R42 and R41 to the cathode of CR23. The voltage at the base of Q19

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Search Drive Circuits (P/O Modules A6
and A7), Simplified Schematic Diagram
Figure 61



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under these conditions is approximately +6 volts when CR33 is not grounded, due to the +10 volts through R39 and through R38 and CR23. Transistor Q19 is held in cutoff by this voltage and -18 volts is applied through R35 and R36 to the anodes of CR14 and CR17. The voltage needed to provide long range search is not present because Q19 is cut off, and the indicator moves between 0 and 50 miles. When CR33 is grounded (TVOR overridden), Q20 is driven into saturation by divider R65 and R66 connected to +10 volts. When Q20 is saturated, diode CR21 is forward biased by the +10 volts through R38 and the voltage at the anode of CR21 is approximately ground potential. The voltage at the base of Q19, applied through R42, R41 and R31 and clamped by CR21 to ground, saturates Q19. Since Q11 is saturated by either the X-Y control or odd/even switch, the necessary voltage is present on the long range search wire to produce long range search.

4. Long Range Channels.

Long range channels are all channels except channels 17 through 56. When the 860E-2 is tuned to a long range channel the long/short range switch is closed. Diodes CR15 and CR18 are forward biased resulting in a negative voltage at the base of Q11. Transistor Q11 is then held in saturation on all long range channels no matter what the conditions of the odd/even switch and the X-Y control. Diode CR20 is also forward biased when the long/short range switch is closed. The voltage at the anode of CR23 is then negative on all long range channels. The voltage at the base of Q19, applied through R42, R41 and R39, saturates Q19. Since Q11 and Q19 are both saturated the necessary voltage is present on the long range search wire to produce long range search.

(c) Search Drive Control. (Refer to figure 61.)

When the 860E-2 is in search and the indicator is moving in an outbound direction, approximately -15 volts is applied to the anodes of CR34 and CR35. Transistor Q22 in the search drive multivibrator is saturated, and the collector of Q22 is at approximately -10 volts. Diode CR51 is forward biased and the voltage at the emitter of emitter follower Q21 is approximately -10 volts. The voltage at the junction of R60 and R59 is approximately -2 volts being limited by CR47, CR48, and CR49 in series. The voltage at the junction of CR48 and CR47 is approximately -1.4 volts. This negative voltage is the search drive signal for outbound search.

When the 860E-2 is slewing inbound, Q22 is cut off, the collector of Q22 is at approximately +8 volts, and CR34 and CR35 are reverse biased. The voltage at the emitter of emitter follower Q21 is approximately +8 volts. The voltage at the junction of R61 and R62 is approximately +2 volts being limited by CR46, CR47, and CR48 in series. The voltage at the junction of CR47 and CR48 is approximately +1.4 volts. This positive voltage is the search drive signal for inbound slewing.

At the beginning of prememory, when the 860E-2 has locked on, the anode of CR35 is at approximately zero volt. When the 860E-2 is tracking, the anodes of CR34 and CR35 are at zero volt. When the 860E-2 is in memory, the anode of CR34 is at zero volt. In each case Q22 is saturated, since Q22 is saturated during outbound (active) search and the state of Q22 remains unchanged during lock on, track and



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memory. In each case the emitter of Q21 is approximately at 0 volt; the voltage at the anode of CR46 is approximately +0.7 volt, and the voltage at the cathode of CR49 is approximately -0.7 volt. Diodes CR47 and CR48 are reverse biased resulting in no search drive voltage.

(d) Test Points.

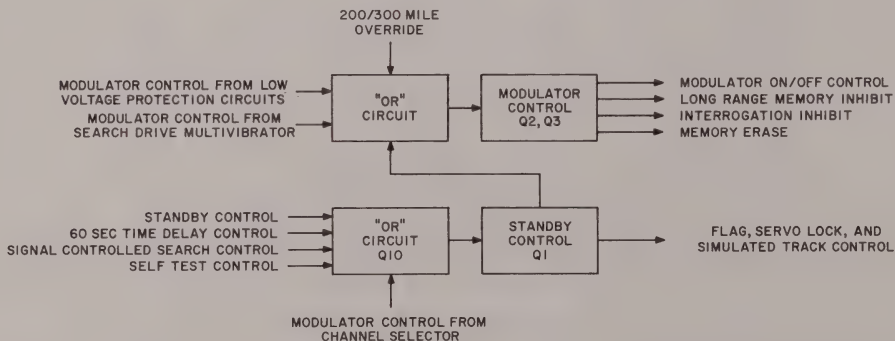
Test point J1 allows inspection of the condition of the long range search control. Test point J10 permits inspection of the condition of the search drive multivibrator.

O. Modulator Control/Standby Circuits.

(1) Block Diagram Theory of Operation. (Refer to figure 62.)

The modulator control/standby circuits receive signals from other portions of the 860E-2 and perform a logic operation to provide the modulator on/off control, long range memory inhibit, interrogation inhibit, memory erase, flag control, servo lock control, and simulated track control. The modulator control/standby circuits are arranged so that one or all of the input signals can command the modulator off. Figure 63 is a table describing the relationship between the output signals and the input signals. The inputs and outputs in figure 63 are numbered for easy reference. It can be seen by close study of figure 63 that inputs 1 through 3 affect outputs 1 through 4 only; and that inputs 4 through 8 affect all outputs.

The modulator control from the search drive multivibrator turns the modulator off during inbound search to prevent interrogation during inbound slew. The modulator control from the low-voltage protection circuit stops the triggering of the silicon controlled rectifiers in the modulator when the line voltage is more than 10 percent below nominal value. This prevents continuous conduction of one or both of the silicon control rectifiers that may occur because of the increased load impedance supplied by the cavity amplifier caused by low-filament voltage.



Modulator Control/Standby Circuits, Block Diagram
Figure 62

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OUTPUT FUNCTIONS					
(3) Frrogation Inhibit		(4) Memory Erase		(5) Flag, Servo Lock, and Simulated Track Control	
it	Not Inhibit (1)	Erase (2)	Not Erase (1)	Flag in View Servo Locked Simulated Track	No Flag No Servo Lock No Simulated Track
	X		X	Output does not respond to input.	
		X			
	X		X		
		X			
	X		X		
		X		(2)	(1)
	X		X		X
		X		X	
	X		X		X
		X		X	
	X		X		X
		X		X	
	X		X		X
		X		X	
	X		X		X
		X		X	

ondition A.

st be in condition B.

Table of Inputs and Outputs of Modulator
Control/Standby Circuits
Figure 63



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memory. In each case the emitter of Q21 is approximately at 0 volt; the voltage at the anode of CR46 is approximately +0.7 volt, and the voltage at the cathode of CR49 is approximately -0.7 volt. Diodes CR47 and CR48 are reverse biased resulting in no search drive voltage.

(d) Test Points.

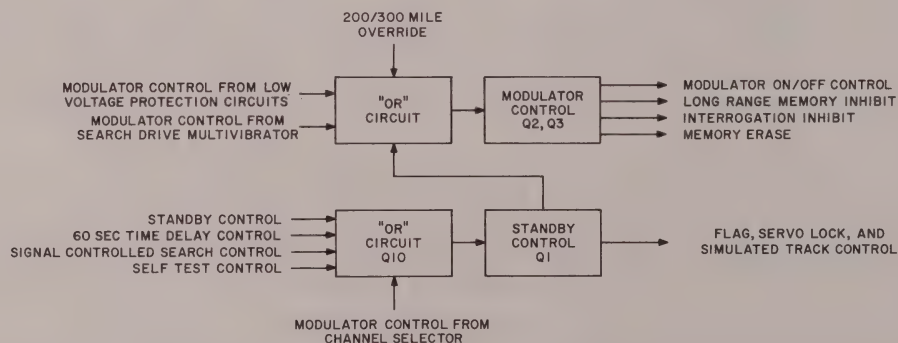
Test point J1 allows inspection of the condition of the long range search control. Test point J10 permits inspection of the condition of the search drive multivibrator.

O. Modulator Control/Standby Circuits.

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The modulator control from the search drive multivibrator turns the modulator off during inbound search to prevent interrogation during inbound slew. The modulator control from the low-voltage protection circuit stops the triggering of the silicon controlled rectifiers in the modulator when the line voltage is more than 10 percent below nominal value. This prevents continuous conduction of one or both of the silicon control rectifiers that may occur because of the increased load impedance supplied by the cavity amplifier caused by low-filament voltage.



Modulator Control/Standby Circuits, Block Diagram

Figure 62



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			OUTPUT FUNCTIONS									
			(1) Modulator On/Off Control		(2) Long Range Memory Inhibit		(3) Interrogation Inhibit		(4) Memory Erase		(5) Flag, Servo Lock, and Simulated Track Control	
			On	Off	Inhibit	Not Inhibit	Inhibit	Not Inhibit	Erase	Not Erase	Flag in View Servo Locked Simulated Track	No Flag No Servo Lock No Simulated Track
			①	②	②	①	②	①	②	①		
INPUT FUNCTIONS	(1) Modulator control from search drive multivibrator	Outbound search (A)	X			X		X		X	Output does not respond to input.	
		Inbound slew (B)		X	X		X		X			
	(2) Modulator control from low-voltage protection circuit	Normal line voltage (A)	X			X		X		X		
		More than 10% below normal (B)		X	X		X		X			
	(3) 200/300-mile override	Override grounded (A)	X			X		X		X		
		Override not grounded (B)		X	X		X		X		②	①
	(4) Standby control	Standby not grounded (A)	X			X		X		X		X
		Standby grounded (B)		X	X		X		X		X	
	(5) 60-second time delay control	After 60-sec time delay (A)	X			X		X		X		X
		During 60-sec time delay (B)		X	X		X		X		X	
	(6) Signal controlled search control	Ground-to-air signal present (A)	X			X		X		X		X
		Ground-to-air signal not present (B)		X	X		X		X		X	
	(7) Self-test control	No pulse from self-test (A)	X			X		X		X		X
		During pulse from self-test (B)		X	X		X		X		X	
	(8) Modulator control from channel selector	Not channeling (A)	X			X		X		X		X
		During channeling (B)		X	X		X		X		X	

① To have this output, all inputs must be in condition A.

② To have this output, one or more inputs must be in condition B.

Table of Inputs and Outputs of Modulator
Control/Standby Circuits
Figure 63

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The 200/300-mile override provides 300 miles search capability. When a 200-mile distance mechanism module is used, the 200/300-mile override is permanently grounded. When a 300-mile distance mechanism module is used, the 200/300-mile override is controlled by an external switch and a switch in the distance mechanism module. The switch in the distance mechanism module grounds the 200/300-mile override for distances from 0 to 200 miles. The 860E-2 is then active from 0 to 200 miles and inactive (modulator off) from 200 to 300 miles. When the external switch is grounded, the 860E-2 is active from 0 to 300 miles.

The self-test control input is unique in that it is a pulsed input while all other inputs are d-c inputs. The output correspond to no pulse from self-test except for approximately 1 second after the self-test switch is activated when the input pulse is applied.

When the modulator is turned off by any of inputs 4 through 8, the 860E-2 is placed in simulated track. During simulated track the collector of the search/track switch is grounded and the interrogation prf is reduced to track rate. When any of inputs 4 through 8 turn the modulator off and then on, trigger circuit no. 1 (figure 61) will apply a trigger to the search drive multivibrator since the prf changes from the track to search rate. The search drive multivibrator will then change to the inbound state, if the long range search control does not prevent it. Therefore, when the distance indication is below 50 miles and the 860E-2 is searching or tracking, the indicator will initiate inbound slew if one of inputs 4 through 8 places the 860E-2 in standby momentarily. The memory is also erased by the same action.

(2) Detailed Theory of Operation. (Refer to figure 64.)

The modulator on/off control and the long range memory inhibit, taken from the collector of Q2, are -18 volts (Q2 cutoff) to turn modulator off and inhibit the long range memory. The outputs are zero volt (Q2 saturated) to turn modulator on and not inhibit the long range memory. When Q2 is cut off, -18 volts is applied to the base of Q3. Transistor Q3 is cut off by -18 volts at the base of Q3 since the emitter of Q3 is held at -15 volts by CR5 and R10. The voltage at the collector of Q3 is approximately +5 volts when Q3 is cut off to inhibit interrogation and erase the memory. When Q2 is saturated, zero volt is applied to the base of Q3 through divider R6, R7 and R8, and Q3 is saturated. When Q3 is saturated, the collector of Q3 is at -15 volts. Therefore when Q2 is cut off, the modulator is off, the long range memory is inhibited, interrogations are inhibited and the memory is erased.

The flag, servo lock, and simulated track control is taken from the emitter of emitter follower Q1. Resistor R5 isolates inputs 1 through 3 from the flag, servo lock and simulated track control. When the emitter of Q1 is negative, Q2 is cut off (modulator off), the flag is in view, the servo is locked, and the 860E-2 is in simulated track. When the emitter of Q1 is positive, the flag is pulled from view, the servo is not locked, simulated track is not present and Q2 is controlled by inputs 1 through 3.

When cathodes of diodes CR2, CR3, and CR4 are positive the emitter of Q1 is positive due to the +10 volts through R3. Transistor Q2 is then saturated (modulator on) if diode CR32 is grounded and the cathodes of diodes CR62 and CR12 are positive. If the cathode of CR2, CR3, CR4, CR12, or CR62 is negative or diode CR32 is not grounded, the modulator is off. Therefore any one of the inputs can command the modulator off.



The modulator control from search drive circuits is at +8 volts during outbound search and -10 volts during inbound search. (See paragraph 6.N.) The -10-volt signal drives Q2 to cut off and turns the modulator off.

The low-voltage protection circuit monitors the unregulated voltage driving the +10-volt supply (+16 volts unregulated). The cathode of diode CR12 is positive when the +16-volt unregulated supply is larger than +13 volts. When the +16-volt unregulated supply falls below 13 volts, diode CR12 is forward biased, since the anode of CR11 is negative. Transistor Q2 is then cut off and the modulator is turned off.

When the anode or cathode of CR32 is not grounded, -18 volts is applied through R64, CR31, and CR30 to cut off Q2 and turn the modulator off. When a 200-mile distance mechanism is used, the cathode of CR32 is permanently grounded and this input function is disabled. Diode CR30 allows Q2 to be biased on when the cathode of CR32 is grounded. When a 300-mile distance mechanism is used, ground is removed from the cathode of CR32 and the override function is applied to the anode of CR32. Diode CR32 allows this override to be connected in common with the TVOR and ILS override at the anodes of CR33 and CR34 (figure 60). When the override ground is not present, -18 volts is applied to the emitter of Q2 and the modulator is turned off.

The standby control is open when the 860E-2 is not in standby. The voltage at the cathode of CR4 is +5 volts when the standby switch is open. The voltage at the base and emitter of Q1 is then positive if diodes CR2 and CR3 are reverse biased and the modulator is not turned off. When the 860E-2 is placed in standby by grounding the standby control, -2 volts is applied to the cathode of CR4. The voltage at the base and emitter of Q1 is negative and transistor Q2 is cut off (modulator off).

The 60-second time delay, signal controlled search and self-test inputs are applied to the base of emitter follower Q10. When none of these inputs are commanding the modulator off, the emitter of Q10 is +8 volts limited by the self-test input. Diode CR3 is then reverse biased, and if diodes CR2 and CR4 are also reverse biased, the voltage at the base and emitter of Q1 is positive and the modulator is not turned off. When any of the inputs to Q10 goes negative, the negative signal is applied through emitter follower Q10, diode CR3 and emitter follower Q1 to Q2. Transistor Q2 is then cut off and the modulator is off.

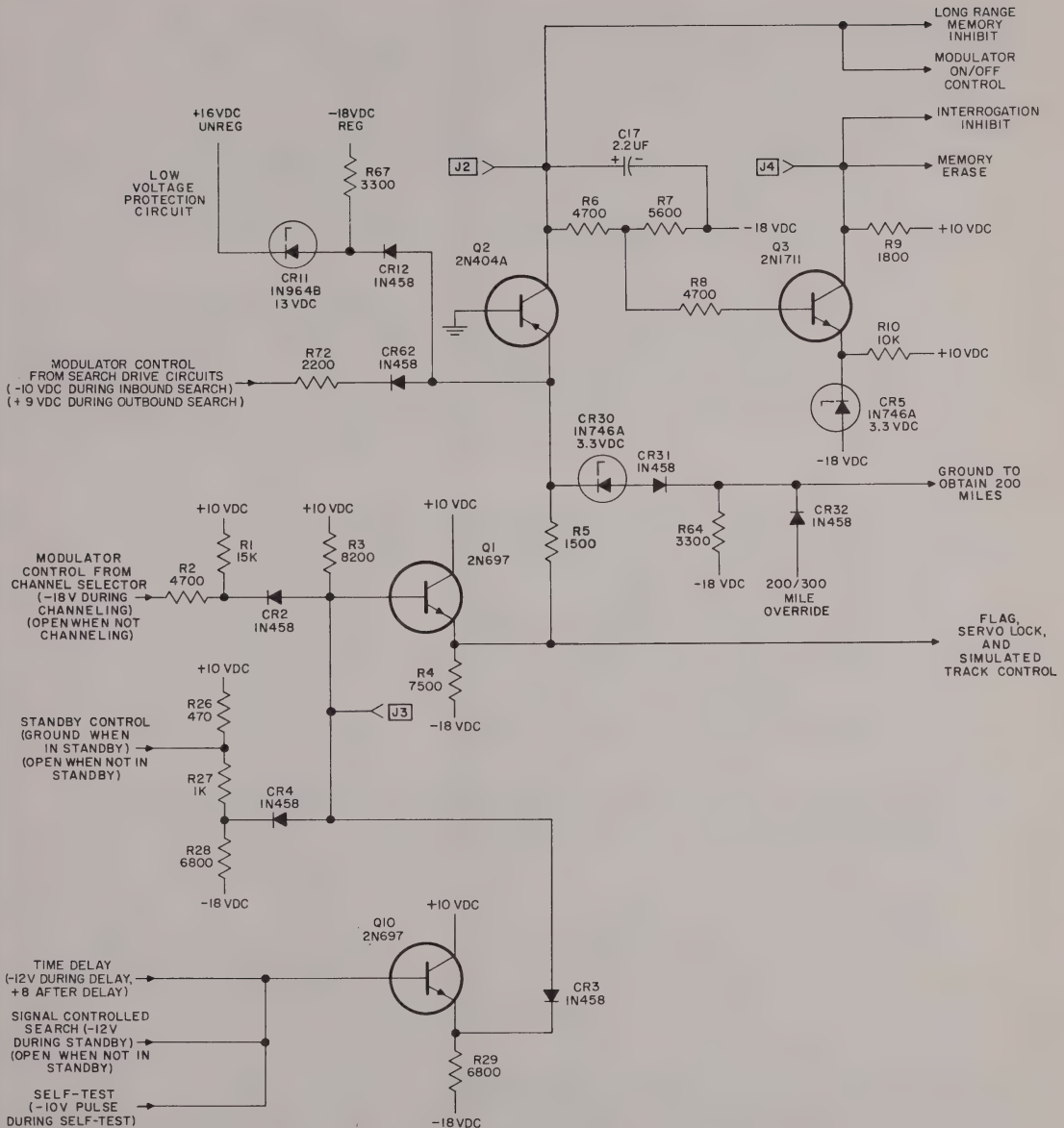
The modulator control from the channel selector is obtained from two redundant sets of mechanical contacts on the Autopositioner. The line is open except during the channeling operation when it is at -18 volts. The -18 volts is applied through CR2, Q1, and R5 to cut off Q2 and turn the modulator off.

(3) Test Points.

Test point J2 permits inspection of the modulator on/off control and long range memory inhibit. Test point J4 permits inspection of the interrogation inhibit and memory erase output signals. Test point J3 permits inspection of the voltage at the base of emitter follower as controlled by inputs 4 through 8 (see figure 63).



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Modulator Control/Standby Circuits (P/O Module A7), Simplified Schematic Diagram

Figure 64



P. Flag Control and Servo Lock Circuits.

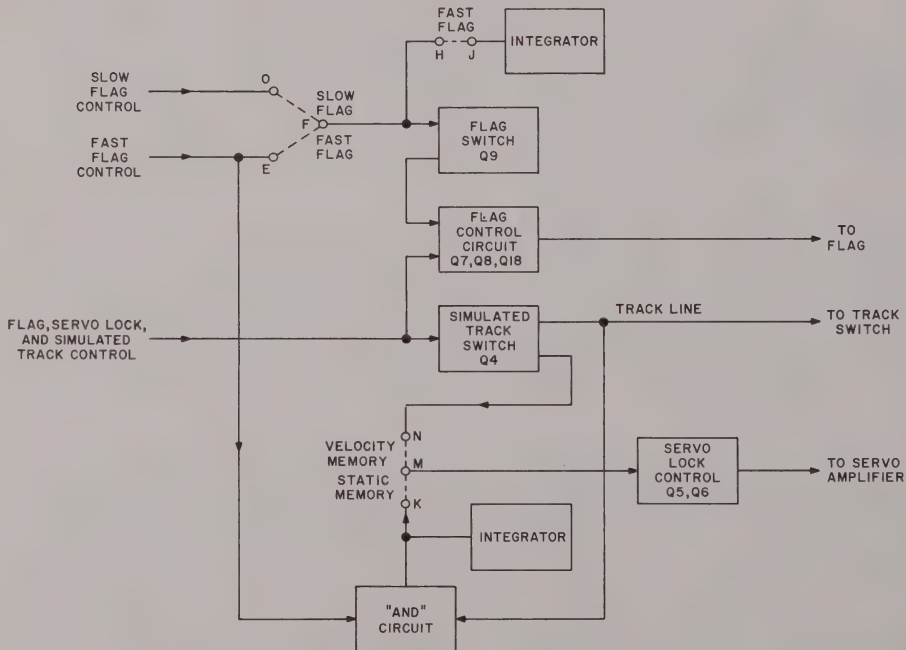
(1) Block Diagram Theory of Operation. (Refer to figure 65.)

(a) Flag Control Circuit.

The flag, servo lock, and simulated track control and the output from the flag switch Q9 are applied to the flag control circuit Q7, Q8, and Q18. The flag control circuit is biased so that the flag is in view except when the flag switch is energized. The flag, servo lock, and simulated track control can command the flag to be in view when the flag switch is energized.

For slow flag operation, jumper O-F is connected so the flag switch is controlled by the slow flag control. The slow flag control responds with the search/track switch (see paragraph 6.M.) so the flag switch is energized (flag out of view) when the 860E-2 is in track or memory.

For fast flag operation, jumpers E-F and H-J are connected so the flag switch is controlled by the fast flag control. The fast flag control responds with the toggle



Flag Control and Servo Lock Circuits, Block Diagram
Figure 65



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(see paragraph 6.M.) so the flag switch is energized (flag out of view) when the toggle, Q18, is saturated. The toggle is saturated during track only. Since the toggle will switch during the reception of an identification signal, the removal of the fast flag control from the flag switch must be slowed to prevent momentary flag operation during identification reception. The integrator connected to the input of the flag switch provides a delay of 2 seconds and allows the 860E-2 to track through the identification signal with the flag continuously pulled from view.

When the 860E-2 is placed in standby by any of inputs 4 through 8 in figure 63, the flag, servo lock and simulated track control causes the flag to cover no matter what the state of the flag switch.

(b) Simulated Track Switch.

Simulated track switch Q4 grounds the track line and places the 860E-2 in simulated track when commanded on by the flag, servo lock and simulated track control.

(c) Servo Lock Control.

Servo lock control Q5 and Q6, when energized, disables the servo amplifier and stops any movement of the indicator. For velocity memory operation, jumper M-N is connected and the servo lock control is controlled by the simulated track switch. The servo is then locked only during simulated track.

For static memory operation, jumper M-K is connected and the servo lock control is controlled by the track line and the fast flag control. The servo is then locked when both the track line is grounded (during track, memory or simulated track) and the toggle is cut off (search or memory or simulated track). The result is that the indicator is locked during simulated track and static memory.

When the 860E-2 is tracking (track line grounded) and an identification tone is received (toggle cut off), the conditions are present to lock the servo. To obtain smooth tracking during the reception of the identification tone, an integrator is connected to the output of the AND-circuit to delay the action of the servo lock for approximately 2 seconds.

(2) Detailed Theory of Operation. (Refer to figure 66.)

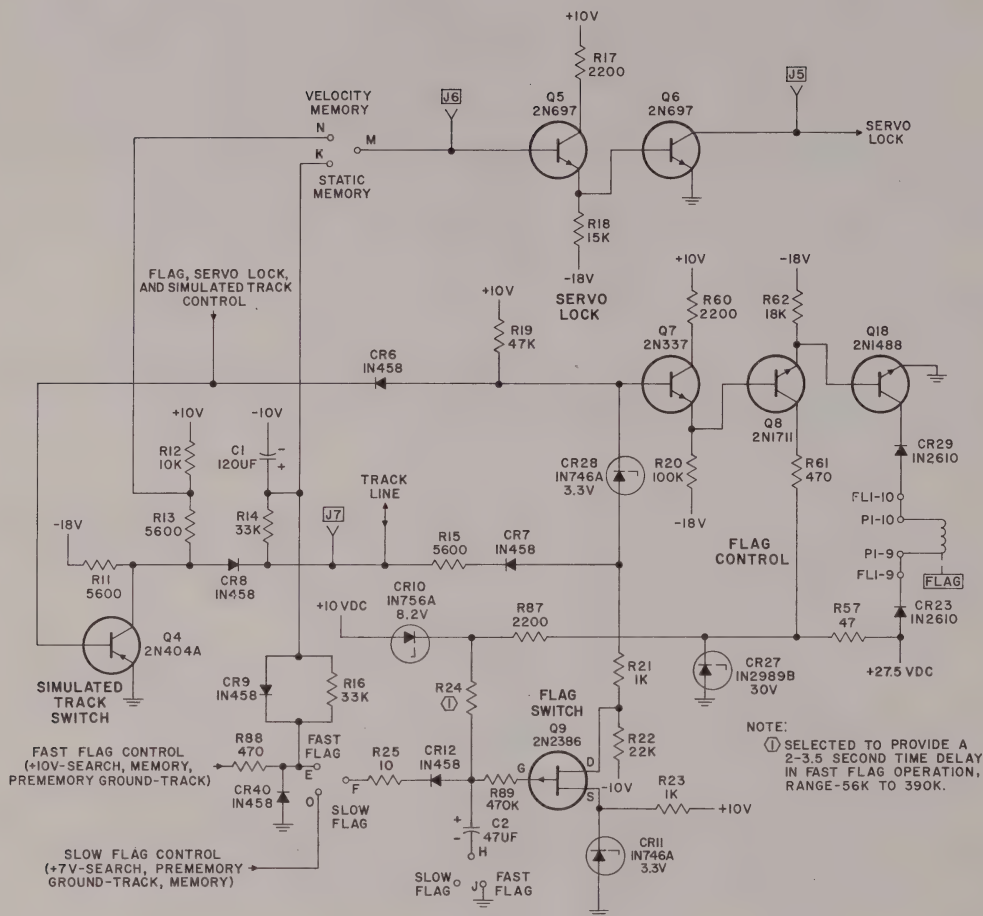
(a) Flag Control Circuit.

1. Slow Flag Operation. (Jumper connect O-F.)

Flag switch Q9 is controlled by the slow flag control during slow flag operation. Transistor Q9 is a P-channel, field-effect transistor that is saturated when the gate is at zero volt with respect to the source, and cut off when the gate is positive with respect to the source. When the search/track switch is in track, the slow flag control is at zero volt and the flag switch, Q9, is saturated. The +3 volts from the cathode of CR11 is applied through the low source to drain impedance of Q9 to the junction of R21 and R22. The resulting voltage at the



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Flag Control and Servo Lock Circuits (P/O Module A7), Simplified Schematic Diagram
Figure 66

anode of CR28 is approximately +2 volts. The base of emitter follower Q7 is then positive if CR6 is reverse biased. The positive voltage is applied through emitter followers Q7 and Q8 to the base of Q18. Transistor Q18 is saturated and the flag is pulled from view. When the search/track switch is in search, the slow flag control input is +7 volts. Diode CR12 is reverse biased, the positive voltage from R24 biases the gate positive, and the flag switch is cut off. The drain of Q9 presents an open circuit to the junction of R21 and R22. The anode of CR28 is then -3 volts or more negative, resulting in ground at the base of Q7. Transistor Q18 is then cut off and the flag drops into view.



2. Fast-Flag Operation. (Jumpers connected E-F and H-J.)

The flag switch, Q9, is controlled by the fast-flag control for fast-flag operation. During search, memory, and prememory when the toggle is cut off, the fast-flag control is at +10 volts. (See paragraph 6.M.) Transistor Q9 is cut off when the fast-flag control is at +10 volts and the base of Q7 is at zero volt. Transistor Q18 is cut off and the flag is in view. During track when the toggle is saturated, the fast-flag control is at approximately zero volt. Transistor Q9 is saturated and the base of Q7 is positive. Transistor Q18 is then saturated and the flag is pulled from view.

The integrator capacitor connected by jumper H-J is discharged quickly by CR12 and R25 when the fast-flag control moves from +10 volts to zero volt (flag covering to flag out of view). When the fast-flag control moves from zero to +10 volts (flag out of view to flag covering), C2 charges from +2 volts to +11 volts through R24. The time required for the voltage at the gate of Q9 to rise to the cutoff value is controlled by R24, which is selected at the factory. If Q9 is replaced, a new value of R24 may be required.

3. Flag Override.

When the flag, servo lock and simulated track control is at ground, the base of Q7 is held at zero volt by CR6. The base of Q7 cannot be made positive by the action of Q9 under these conditions and the flag is covering. For the conditions that cause the flag, servo lock, and simulated track control to be ground, see paragraph 6.O. During search, -15 volts is applied through R15, CR7 and CR28 to the base of Q7. The base of Q7 cannot be made positive by the action of Q9 and the flag is covering.

(b) Simulated Track Switch.

When the flag, servo lock, and simulated track control is negative, Q4 is saturated and the collector of Q4 is at ground potential. The track line is held at zero volt through diode CR8. When Q4 is cut off, the collector of Q4 is held at -15 volts by the track line through CR8.

(c) Servo Lock Control.

1. General.

When a positive voltage is applied to the base of emitter follower Q5, transistor Q6 is saturated and the supply voltage is removed from the input stages of the servo amplifier. (See paragraph 6.L.)

2. Velocity Memory Operation. (Jumper connected M-N.)

When the simulated track switch is cut off, the voltage at the base of Q5 is -6 volts. Transistor Q6 is cut off and the servo is not locked. When the simulated track switch is saturated, the base of Q5 is at +3 volts. Transistor Q6 is then saturated and the servo is locked.



3. Static Memory Operation. (Jumper connected M-K.)

For static memory operation, the voltage at the base of Q5 is obtained from the track line through R14 and from the fast-flag control through R16. When the track line is at zero volt, provided by either the simulated track switch or the search/track switch, and the fast-flag control is at +10 volts, the base of Q5 is at +5 volts and the servo is locked. When the track line is at -15 volts and the fast-flag control is +10 volts, the voltage at the base of Q5 is negative and the servo is not locked. When the track line is at zero volt and the fast-flag control is at ground, the voltage at the base of Q5 is ground and the servo is not locked. When the track line is at -15 volts and the fast-flag control is at ground, the voltage at the base of Q5 is negative and the servo is not locked. The servo is therefore locked during simulated track and memory.

When the 860E-2 is tracking, the track line and the fast-flag control are at ground. During the identification tone the fast-flag control moves to +10 volts. The voltage at the base of Q5 increases at a rate determined by the time constant of C1 and R14 and R16 in parallel. This delay in the application of the change in the voltage of the fast-flag control to the base of Q5 prevents the servo from being locked during the reception of the identification tone. Diode CR9 provides a low impedance discharge path for C1 when the fast-flag control changes from +10 volts to zero volt. The servo lock is therefore released quickly.

(d) Test Points.

Test point J6 permits inspection of the input to the servo lock circuits. Test point J5 permits inspection of the servo lock signal. Test point J7 permits inspection of the condition of the track line.

Q. Signal Controlled Search Circuits. (Refer to figure 67.)

(1) General.

The signal controlled search (SCS) circuit receives decoded replies from the decoder which include distance replies, squitter, and identification tone signals. When the reply rate is less than a threshold value set by R204, Q202 is saturated and its collector is at -12 volts. The collector voltage is applied to the modulator control/standby circuits and places the 860E-2 in standby. (See paragraph 6.O.) When the reply rate is higher than the threshold value, Q202 is cut off and the SCS loses control of the modulator control/standby circuits.

(2) Theory of Operation.

Decoded signals (positive pulses) from the decoder are applied to the base of emitter follower Q201. When no decoded replies are received, C203 is charged to a level less negative than -12 volts from the arm of R204 through CR201 and R205. Transistor Q201 is cut off since the base of Q201 is at -12 volts when no pulses are applied. Transistor Q202 is saturated by the current through R206 and diode CR202 is reverse biased. The output of Q202 (-12 volts) is applied to the modulator control/standby circuits to turn off the modulator and place the 860E-2 in standby.



When positive pulses (decoded signals) are applied to Q201, capacitor C201 is charged through CR201. During the time between pulses, C201 discharges through R202 and R203 with CR201 reverse biased. A d-c charge is then built up on capacitor C201 that is proportional to the rate of decoded replies. Resistors R205 and C203 form a low-pass filter to remove ripple from the d-c voltage at the cathode at CR202. When the rate of the decoded replies is high enough to charge C201 to the level required to forward bias CR202, transistor Q202 is cut off and the collector of Q202 is no longer at -12 volts.

Diodes CR202, CR203, CR204 and CR207 form an OR-circuit so that a voltage more negative than -12 volts applied to the cathode of any one of the diodes cuts off Q202.

A voltage more negative than -12 volts on any cathode can then disable the circuit so it cannot place the 860E-2 in standby. When no command is applied to the diodes, Q202 is biased on and the 860E-2 is placed in standby.

The voltage on the cathode of diode CR204 is controlled by the self-test control. When the self-test is not active, the cathode of CR205 is at +9 volts. The cathode of CR204 is then at -9 volts and no action occurs. During self-test, the cathode of CR205 is grounded. The cathode of CR204 is then at approximately -15 volts and Q202 is cut off. The SCS circuit is then disabled and cannot place the 860E-2 in standby during self-test.

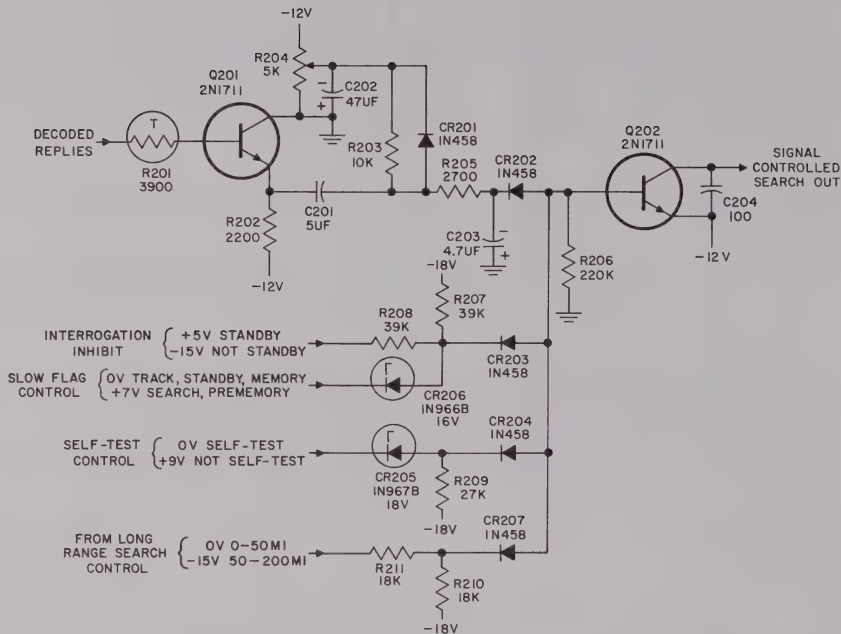
The voltage at the cathode of CR203 is controlled by the interrogation inhibit and the slow flag control. The two signals disable the SCS circuits during memory to prevent the 860E-2 from being placed in standby and the servo from being locked before completion of velocity memory. The slow flag control is at ground during memory and standby when either the search/track switch or the simulated track switch are at ground. When the slow flag control is at ground, the voltage at the cathode of CR203 is -16 volts and the SCS circuits are disabled.

The interrogation inhibit prevents the slow flag control from disabling the SCS during standby by applying +5 volts to R208 to result in -6 volts at the anode of CR203. If the SCS was disabled during standby by the slow flag control, the SCS circuit would not place the 860E-2 in standby when replies were lost during search. If the 860E-2 is searching and the received signal is lost, CR202 would be reverse biased and Q202 would be saturated to place the 860E-2 in standby. The slow flag control would disable the SCS during standby and the 860E-2 would be going to search. The slow flag control would not disable the SCS during search and the SCS would again place the 860E-2 in standby. Switching in and out of standby would then continue indefinitely.

The voltage at the cathode of CR207 is controlled by the range limit switch in the long range search circuits. When the distance indication is between 50 and 200 miles, -15 volts is applied to R211. The cathode of CR207 is held at -16 volts and CR207 conducts. Transistor Q202 is held in cutoff, and the SCS is disabled. When the distance indication is between 0 and 50 miles, R211 is grounded. The cathode of CR207 is then at -9 volts and the SCS is not disabled. If the 860E-2 is searching or tracking beyond 50 miles and the received signal is lost, the indicator will search outbound to zero and stop. When a signal is again received, search will begin from zero mile. If the 860E-2 is on an overridden short range channel when the received signal is lost and the 860E-2 is switched out of override, the indicator will slew inbound to 50 miles and



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Signal Controlled Search Circuits (P/O Module A4), Simplified Schematic Diagram
Figure 67

stop. If the 860E-2 is on a long range channel when the received signal is lost and the 860E-2 is tuned to a short range channel, the indicator will slew inbound to 50 miles and stop.

(3) Adjustments.

Resistor R204 allows adjustment of the d-c voltage on C203 when there are no replies. The signal level required to remove the 860E-2 from standby is then controlled by R204.

R. Self-Test Circuits.

(1) General Operation.

When the self-test switch is closed, the no. 2 modulation pulse from the interrogation generator is delayed approximately 54 usec by the self-test circuits and applied to the



distance reply multivibrator in the decoder. The 54-usec time delay simulates the time delay in the ground station between the reception of the second pulse of an interrogation pulse pair and the transmission of the second pulse of a reply pulse pair and the delay in the receiver and transmitter of the 860E-2. The computing circuits in the 860E-2 then measure the time between the no. 2 modulation pulse from the interrogation generator and the output of the self-test circuits. The 860E-2, if operating properly, will lock on at zero mile. The self-test circuits also provide outputs to erase memory and provide inbound slew from any distance at the beginning of self-test.

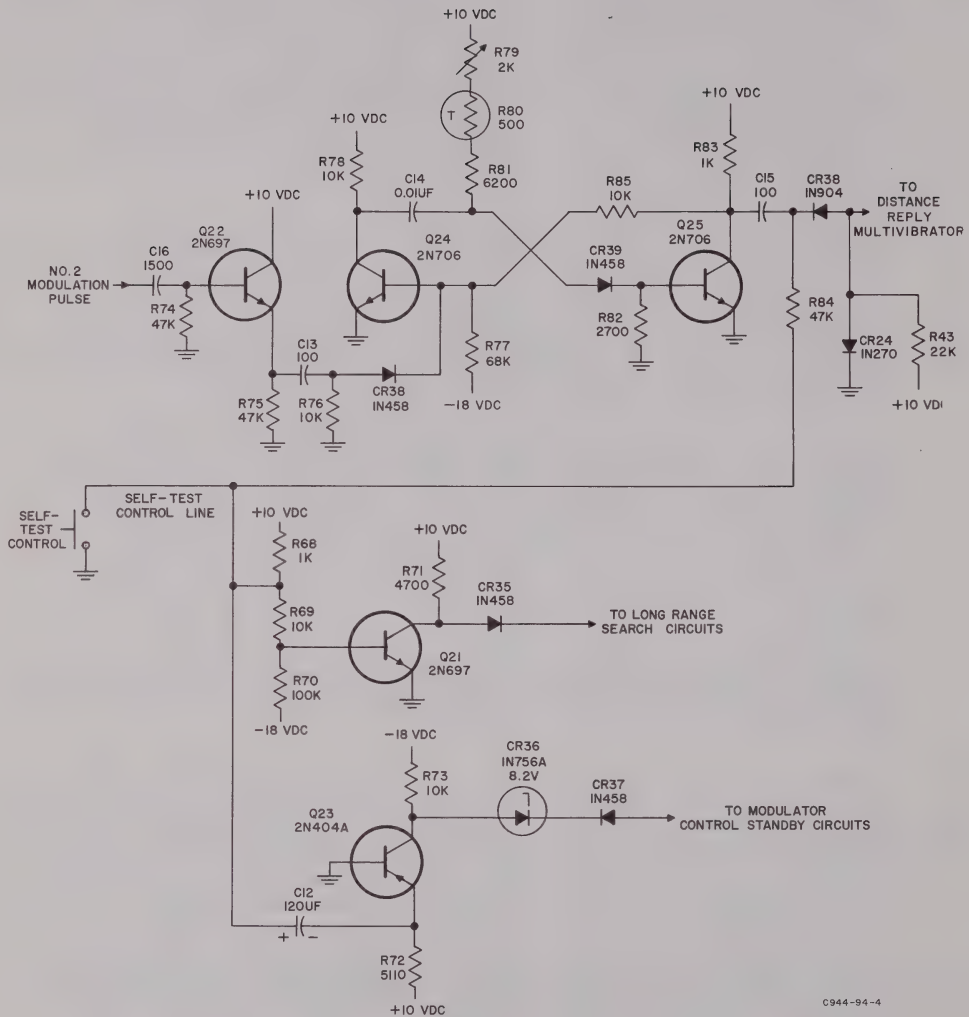
(2) Detailed Theory of Operation. (Refer to figure 68.)

The positive no. 2 modulator pulse from the interrogation generator is applied to isolating emitter follower Q22 by C16. The output of Q22 is differentiated by C13 and applied through CR38 to the monostable multivibrator consisting of Q24 and Q25. Before the pulse is applied to the multivibrator, Q25 is held in saturation by the network consisting of R79, R80, R81, and CR39. When Q25 is in saturation, the voltage at the collector of Q25 is approximately ground. The voltage applied to the base of Q24 is then approximately -1.5 volts and Q24 is cut off.

When the positive trigger is applied to the base of Q24, transistor Q24 is turned on and the collector of Q24 moves from +10 volts to ground. The voltage at the anode of CR39 then is negative and Q25 is cut off. After C14 charges through R79, R80, and R81 to forward bias CR39, transistor Q25 is turned on and the multivibrator returns to its original state. The positive pulse output, taken at the collector of Q25, is differentiated by C15 and R84. The resulting signal is a positive trigger at the beginning of the leading edge of the pulse and a negative trigger at the trailing edge of the pulse. The anode of CR38 is held at ground potential by CR24. If the self-test control is open, +9 volts is present at the cathode of CR38 and neither trigger is passed to the reply multivibrator. If the self-test control is grounded, the cathode of CR38 is at ground potential. The negative trigger is passed by CR38 to trigger the reply multivibrator in the decoder.

Before the self-test switch is closed, transistor Q23 is saturated by R72 connected to +10 volts and the collector is at zero volt. Diode CR37 is reverse biased by this voltage. When the self-test switch is closed, the self-test control line moves from +9 volts to zero volt. The negative change in the voltage drives the emitter of Q23 momentarily to -9 volts. Capacitor C12 discharges through R72. Transistor Q23 is then momentarily cut off at the beginning of the self-test period and remains cut off until C12 discharges to zero volt. Transistor Q23 is cut off during this time. A negative 10-volt pulse is applied through CR36 and CR37 to the modulator control/standby circuits and places the 860E-2 in standby for approximately 1/2 second. The simulated track switch (figure 66) causes the 860E-2 to be in simulated track for the 1/2 second. Trigger circuit no. 1 (figure 61) then applies a trigger to the search drive multivibrator to switch it to the inbound state, if necessary, to result in inbound slew after the pulse.

When the self-test switch is closed the voltage applied to the base of Q21 changes from +0.5 volt to approximately -2 volts. Transistor Q21 is then cut off during self-test and +10 volts is applied through CR35 to the base of Q19 in the long range search circuits (see figure 61). Transistor Q19 is then cut off and the long range search



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Self-Test Circuits (P/O Module A7), Simplified Schematic Diagram
Figure 68



voltage from the long range search wire, which overrides trigger circuit no. 1, is removed if it is present. The indicator then slews inbound if the 860E-2 was searching or tracking beyond 50 miles.

(3) Adjustments.

Variable resistor R79 is used to adjust the time delay between the no. 2 modulator pulse and the output pulse of the self-test circuits to obtain lock-on at zero mile.

S. Power Supply.

(1) Power Supply Outputs.

Figure 69 lists the outputs of the power supply and their characteristics.

SUPPLY	CHARACTERISTICS
-18 volts d-c	1000 ma, transistor regulated.
-12 volts d-c	100 ma, Zener regulated.
+10 volts d-c	300 ma, transistor regulated.
-35 volts d-c	1 ma, unregulated.
+150 volts d-c	95 ma, unregulated.
26 volts a-c	380 to 420 Hz. Taken from pins 3 and 5 of T2. Used for synchro and servo motor excitation.
18 volts a-c	380 to 420 Hz. Taken from pins 4 and 5 of T2. Used for rate generator excitation.
5 volts a-c	380 to 420 Hz. Taken from pins 6 and 8 of T2. Used for chopper excitation.
6.0 volts a-c	300 to 1000 Hz, 0.3 amp. Taken from pins 3 and 5 of T3. Used for filament voltage on 7486 tripler.
5.7 volts a-c	300 to 1000 Hz, 4 amp. Taken from pins 4 and 5 of T3. Used for filament voltage on 7815 cavity power amplifiers.
4.6/11 volts a-c	380 to 420 Hz. Taken from pins 3, 4, and 5 of T4. Used for hundreds digit switch.

Table of Power Supply Outputs
Figure 69



(2) Description of Power Supplies. (Refer to figure 78, sheet 6.)

(a) -18-Volt D-C Supply.

The output of transformer T1, taken at terminals 6, 7, and 8, is full wave rectified by CR5 and CR6 and a nominal 27 volts is developed across C4. Diode CR8 and transistors Q4, Q5, Q6, and Q7 make up the voltage regulating network for the -18-volt supply. A negative increase in the voltage at the anode of CR8, applied to the emitter of Q7, caused by an increase in the input voltage to T1 or change in load, increases the current through Q7. An increase in the current through Q7 increases the voltage drop across R6 resulting in a less positive voltage at the base of Q6. A less positive voltage at the base of Q6 drives Q4 toward cutoff. The voltage drop across Q4 is increased and the negative increase in the voltage at the anode of CR8 is compensated for. Capacitor C5 reduces ripple on the -18-volt line. Diode CR15 prevents a large positive voltage from being applied across bypass capacitor C6 if fuse F4 is blown. Variable resistor R9 permits adjustment of the operating point of Q7 and therefore the output voltage of the -18-volt supply. Fuse F4, 1.5-amp normal blow, protects the power supply from damage if the -18-volt line is grounded.

(b) -12-Volt D-C Supply.

Forward biased diodes CR9, CR10, CR11 and Zener diode CR13 provide -12 volts d-c. The forward biased diodes CR9, CR10 and CR11 provide temperature compensation. Current for the supply is provided by R11 connected to -18 volts d-c. Diode CR14 prevents a large positive voltage from being applied across C10 if fuse F4 is blown.

(c) +10-Volt D-C Supply.

The output of transformer T1 taken at terminals 3, 4, and 5, is full wave rectified by CR1 and CR2 and a nominal +16 volts is developed across capacitor C1. Diode CR7 and transistors Q1, Q2, and Q3 make up the voltage regulating network for the +10-volt supply. If the output voltage across R3, R4, and R5 should decrease because of a change in load or decrease in voltage applied to T1, the voltage applied to the base of Q3 will be less positive. Less current will then flow through Q3 and the voltage drop across R1 will decrease. The voltage at the base of Q1 will then be more positive due to emitter follower action to compensate for the decrease in output voltage. Variable resistor R4 permits adjustment of the operating point of Q3 and therefore the output voltage of the +10-volt supply. Fuse F3, 1/2 amp normal blow, protects the power supply from damage when the +10-volt line is grounded. Diode CR16 prevents a large negative voltage from being applied across C3 if F3 is blown.

(d) -35-Volt D-C Supply.

The output of transformer T1, taken at terminals 4 and 5 is applied to a full wave voltage doubler consisting of CR19, CR20, C13 and C8. During the positive half cycle of the sine wave, C13 is charged through CR19. During the negative half cycle, capacitor C8 is charged by a voltage equal to the charge on C13 and the amplitude of the sine wave. The charge on C8 is then equal to approximately twice the peak value of the applied sine wave.



(e) +150-Volt D-C Supply.

The output of transformer T1, taken at terminals 9, 10, and 11 is full wave rectified by diodes CR3 and CR4. Capacitor C9 provides filtering to remove ripple from the +150-volt supply.

(f) (Deleted)

(3) 60-Second Time Delay.

When the 860E-2 is turned on, -18 volts, +10 volts, and -12 volts are applied to Q8, Q9 and associated circuitry. The base of Q9 is immediately at -12 volts, C7 is completely discharged, CR17 is reverse biased, and Q9 is saturated. The output of the time delay, taken at the collector of Q9, is then -12 volts and the 860E-2 is in standby. Transistor Q8 is turned on at the beginning of the time delay and provides a constant current to charge C7. The amount of current is determined by R12, R13, R14, and R17. After C7 has charged so the collector of Q8 is more negative than -12 volts, diode CR17 is forward biased. The current through R15, which previously forward biased Q9, is diverted through CR17 and Q8. Transistor Q9 is then cut off and the output of the time delay circuit rises toward +10 volts and the 860E-2 is taken out of standby. When the 860E-2 is turned off, C7 discharges through CR17 and CR18. Variable resistor R17 provides a means of adjusting the time delay.

(4) Miscellaneous.

(a) Power Relay.

The power relay, K1, switches the primary power 115 volts at 300 to 1000 Hz, 115 volts at 300 to 420 Hz, and 27.5 volts dc. Pin 1 of relay K1 coil is connected to the external 27.5-volt dc line at FL1-61. Pin 7 of the relay coil is connected to the DME control unit through FL1-41 and P2-9. Primary ac power and external or internal 27.5 volts dc are applied to the 860E-2 by grounding P2-9. If the DME control has no provisions to ground P2-9, a header plate (Collins part number 306-1904-00) is available to be used in place of K1. When the header plate is plugged in, pins 11 and 12, 8 and 9, 5 and 6, and 2 and 3 are connected together to apply primary power to the 860E-2. If a header plate is used with a DME control that has an OFF position, the 860E-2 will remain in standby when the control is in the OFF position unless the standby line is grounded.

(b) 26-Volt AC Power.

The 26 volts ac from pins 3 and 5 of transformer T2 is connected internally to the servo motor. Connections to the synchro repeater system must be made externally with jumper from P1-2 to P1-22 and P1-1 to P2-28.



(c) Blower B1.

The blower B1 is powered from the 115-volt, 380- to 420-cps bus. The ground return of the blower is not connected internally in the 860E-2. External jumper from P2-31 to P2-28 must be connected to operate the blower.

(d) Chopper Excitation Transformer T5.

Transformer T5 is an isolation transformer with a 1:1-voltage ratio that supplies 5-volt commutation to the chopper. Isolation of the chopper from T2 is necessary to avoid generation of chopper offset voltages because of capacitive unbalance through T2 to ground.

(e) Primary Power Fuses.

1. F1.

Fuse F1 is a 1-1/2-amp normal blow fuse in series with the 115-volt, 300- to 1000-cps primary power bus. Faults through transformer T1, filament transformer T3, internal 27.5-volt transformer T6, and channel selector bridge transformer T3 are protected by F1.

2. F2.

Fuse F2 is a 1-1/2-amp normal blow fuse in series with the 115-volt, 380- to 420-cps bus. Faults through blower B1, elapsed time indicator M1 (optional), and T2 are protected by F2.

T. Channel Selector.

(1) Mechanical Tuning Operation. (Refer to figure 70.)

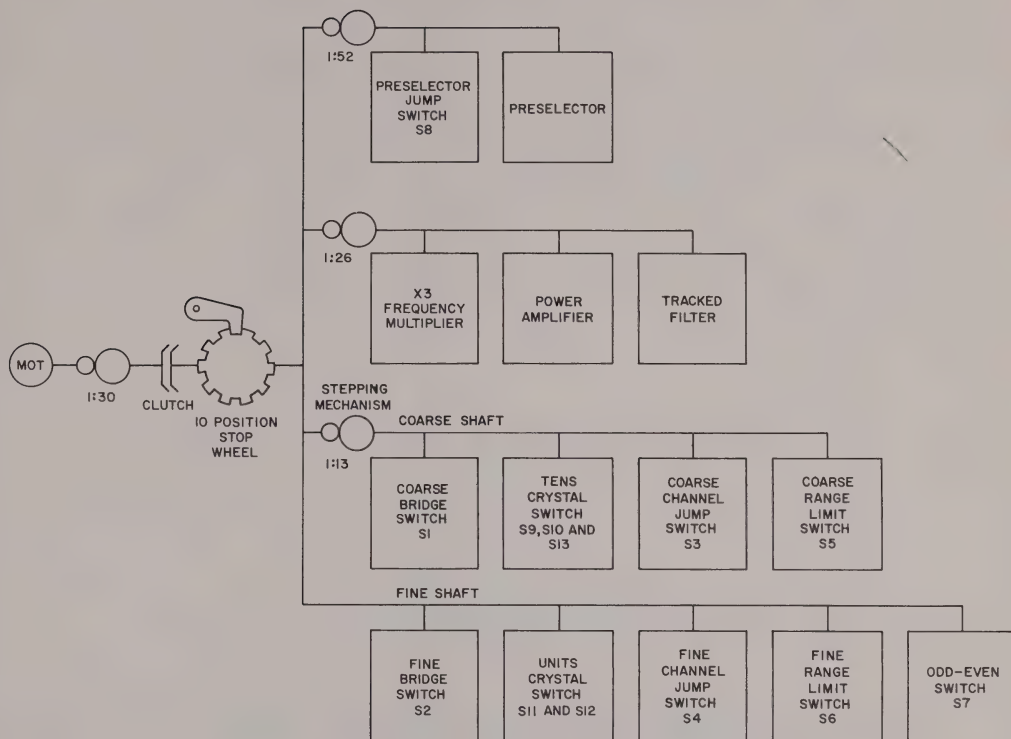
The tuning operation begins when the pawl is lifted from the stop wheel notch and excitation is applied to the motor. A description of the conditions necessary to begin and end the tuning cycle is described in paragraph 6.T.(2)(b). During the tuning operation the fine shaft is driven by the motor through a 1:30 gear reduction and the clutch and stop wheel assembly. One-tenth of a rotation in the fine shaft corresponds to a change of one channel.

The coarse shaft is linked to the fine shaft through a 1:13 stepping mechanism. The coarse shaft therefore moves 1/13 of a revolution for every complete revolution of the fine shaft so that 1/13 of a rotation in the coarse shaft corresponds to a change of 10 channels.

The shaft, which tunes the X3 frequency multiplier, the power amplifier, and the tracked filter, moves 1/2 revolution for every 13 revolutions of the fine shaft, or 1 revolution of the coarse shaft. The reason for the gear reduction is that 180 degrees of rotation in the shaft driving the tracked filter tunes the tracked filter, the power amplifier and X3 multiplier over the entire transmit range, while 360 degrees of rotation in the coarse shaft are required to select the crystals required for the complete transmit range. The shaft that tunes the preselector makes 1/4 revolution for a complete rotation of the coarse shaft.



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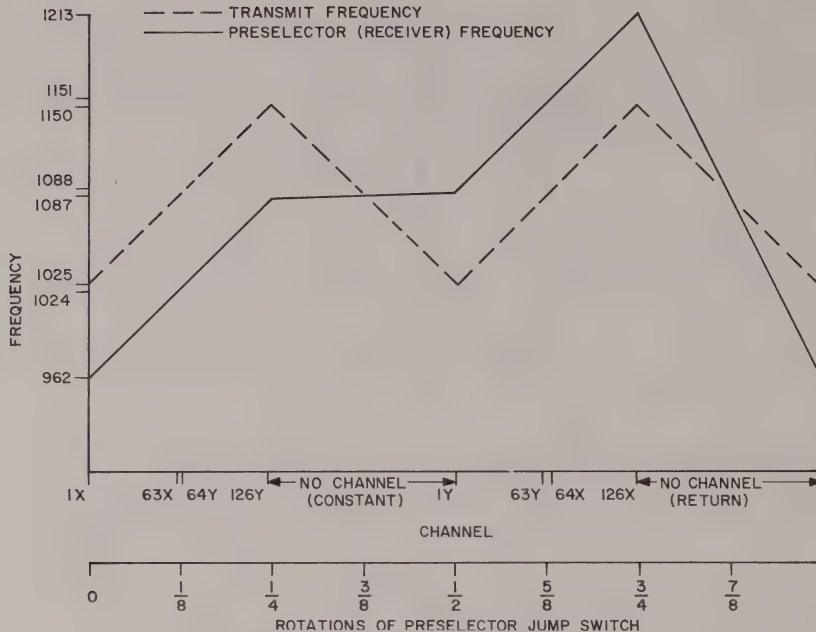


Mechanical Tuning, Schematic Diagram
Figure 70

Figure 71 shows the tuned frequency of the transmit circuits and preselector and the corresponding selected channel as a function of the position of the preselector tuning shaft. The reference position is the shaft position for the 860E-2 tuned to channel 1X. During the first 1/8 revolution, channels 1X through 63X are selected, the transmit circuits are tuned to 1025 mc through 1087 mc, and the preselector is tuned to 962 mc through 1024 mc. During the second 1/8 revolution, channels 64Y through 126Y are selected, the transmit circuits are tuned to 1088 mc through 1150 mc, and the preselector is tuned to 1025 mc to 1087 mc. During the 1/4 rotation, from 1/4 to 1/2, the transmitter circuits are returned to 1025 mc and the preselector is constant. After this portion of the cycle the preselector is tuned to a frequency above the transmit frequency. During the portion of the tuning cycle between 1/2 and 5/8 revolution of the preselector drive, channels 1Y through 63Y are selected, the transmit circuits are tuned to 1025 mc through 1087 mc, and the preselector is tuned to 1088 mc through 1150 mc. During the portion of the tuning cycle between 5/8 and 3/4 revolution of the preselector drive, channels 64X through 126X are selected, the transmit circuits



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Shaft Position Vs Frequency
Figure 71

are tuned to 1088 mc through 1150 mc, and the preselector is tuned to 1151 mc through 1213 mc. During the last 1/4 revolution of the preselector drive, the transmit circuits are returned to 1025 mc and the preselector is returned to 962 mc to begin a new cycle.

(2) Electronic Channeling Circuits.

(a) Principles of Resistive Bridge Tuning.

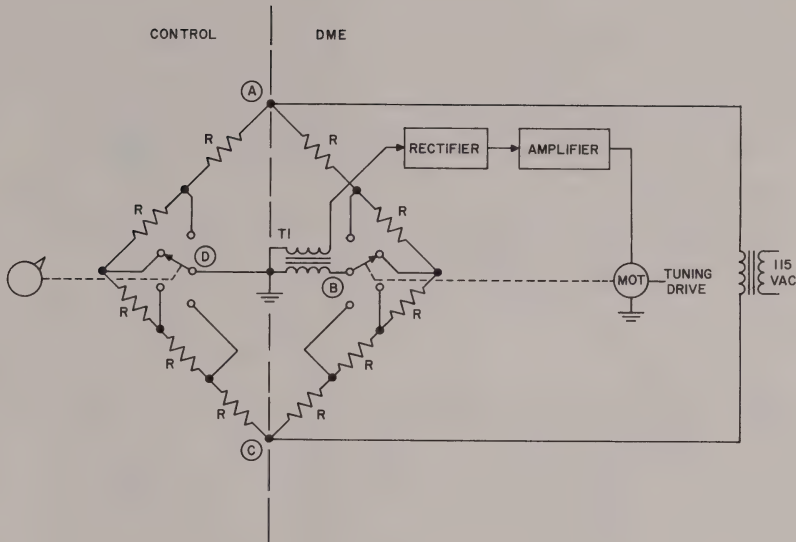
Figure 72 is a simplified schematic of a basic resistive tuning system.

When the bridge is balanced ($\frac{R_{ab}}{R_{bc}} = \frac{R_{ad}}{R_{dc}}$), as shown in figure 72, no current flows through the primary of the transformer. When the switch in the control is moved to a new position the bridge becomes unbalanced and current flows through the primary of the transformer developing a voltage in the secondary. This voltage is rectified and applied to a servo motor that drives the switch in the DME. When the switch in the DME is driven to the position to balance the bridge, the drive voltage is zero and channeling is complete.

In the 860E-2, two resistive bridges are used for tuning. One (fine bridge) is for units and has 10 positions the other (coarse bridge) is for tens and has 13 positions. The principle of operation of the larger bridges is the same as that described above for the simplified system.



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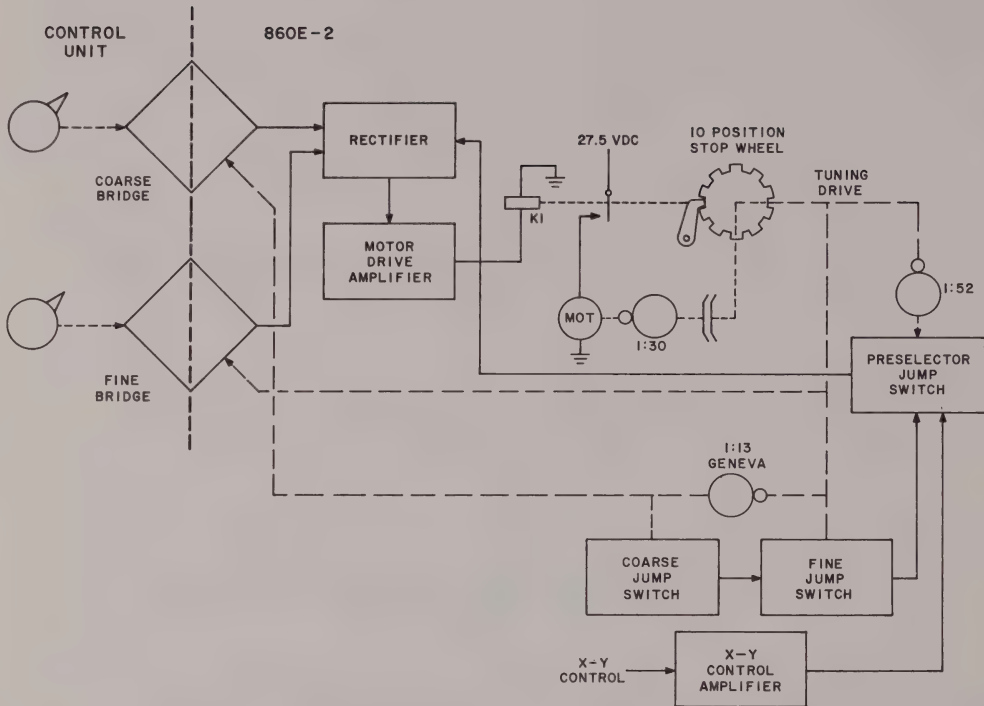


Basic Resistive Bridge Tuning System, Simplified Schematic Diagram
Figure 72

(b) Block Diagram Theory of Operation. (Refer to figure 73.)

The channeling operation begins when either or both the coarse bridge and/or the fine bridge is unbalanced by the selection of a new channel by the control unit. When a bridge is unbalanced, the output of the bridge is rectified and amplified. Relay K1 is energized by the output of the amplifier and +27.5 volts is applied to the motor and the pawl is lifted from the stop wheel notch. The tuning operation then proceeds as described in paragraph 6.T.(1). The channeling operation stops when the inputs to the rectifier from the preselector jump switch, the coarse bridge and the fine bridge are zero. The input to the rectifier from the preselector jump switch is zero when the preselector drive is in the correct segment of rotation for the selected channel. The input to the rectifier from the coarse bridge is zero when the coarse shaft is in the correct tens and hundreds segment. The input to the rectifier from the fine switch is zero when the fine shaft is in the correct units segment.

The fine and coarse jump switches, the X-Y control amplifier and the preselector jump switch work together to determine if the preselector shaft is in the correct segment of rotation. The preselector jump switch monitors the position of the preselector drive shaft. The coarse and fine jump switches and the X-Y control amplifier monitor the channel to which the transmit circuits are tuned. When the



Electrical Tuning Circuits, Block Diagram

transmit circuits are tuned to a channel in the correct segment of rotation of the preselector drive, the output of the preselector jump switch is zero. The above action tunes the preselector either above or below the transmit frequency as determined by the channel selected (see figure 71).

After the preselector drive shaft is in the correct segment of rotation, the motor drives the coarse and fine bridge until they are balanced. The input to the rectifier is then zero and relay K1 is de-energized. The pawl is dropped in the notch in the stop wheel corresponding to the units digit in the selected channel, and the excitation is removed from the motor.



(c) Detailed Theory of Operation. (Refer to figure 74.)

1. Motor Drive Amplifier.

When the input to the amplifier from the rectifier is positive, diode CR14 is forward biased and a positive voltage is applied to the base of emitter follower Q1. Transistor Q2 is then saturated and the base and emitter of emitter follower Q3 are at ground. Transistor Q4 is cut off and current does not flow through relay K1.

When the anode of diode CR14 is at ground or a negative potential, zero volt is applied through emitter follower Q1 to the base of Q2. Transistor Q2 is then cut off and +10 volts is applied through emitter follower Q3 to the base of Q4. Transistor Q4 is saturated and relay K1 is energized. Contacts 2 and 1 of relay K1 make, and 27.5 volts is applied to the motor.

2. Channeling Operation.

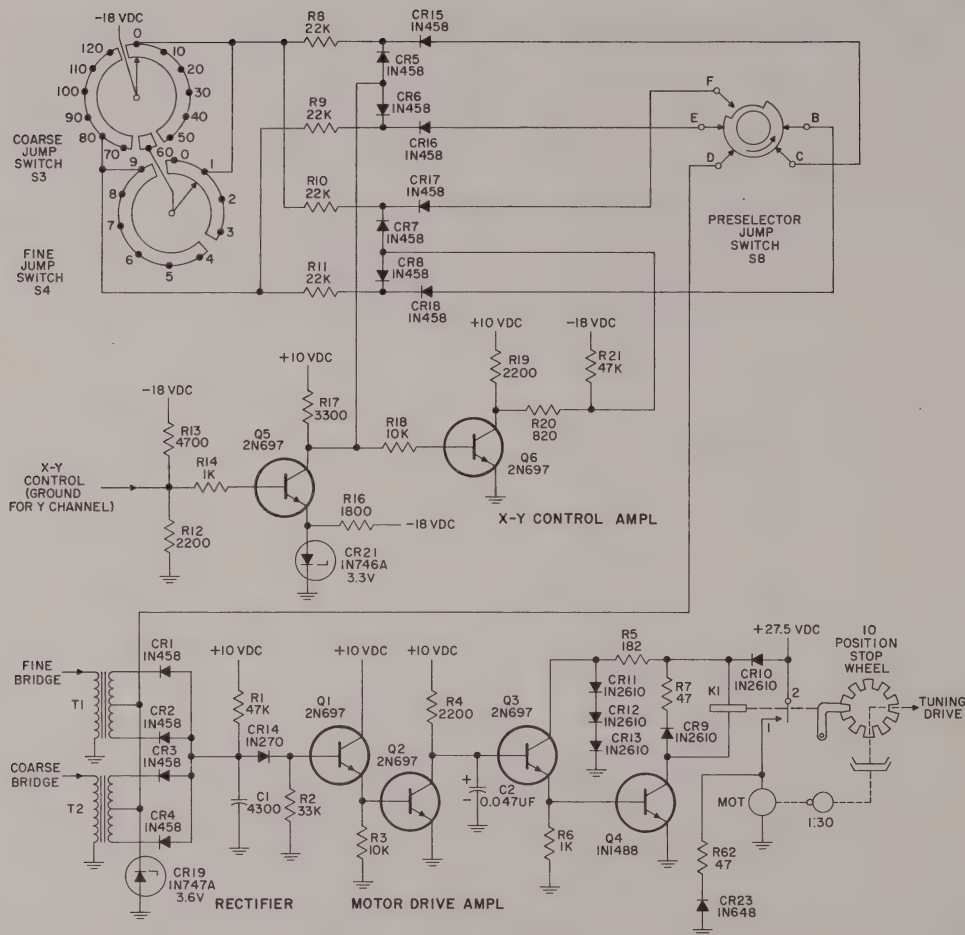
Channeling begins when a channel is selected in the control unit and the coarse or fine bridge is unbalanced. When the fine bridge is unbalanced, an a-c voltage is applied to the primary of transformer T1. During one half-cycle of the output of T1, the cathode of CR1 is negative with respect to the center tap of T1. During the other half-cycle, the cathode of CR2 is negative with respect to the center tap of T1. Since the output of T1 is much larger than 3.6 volts, the cathode of either CR1 or CR2 is negative. Diode CR14 is then reverse biased and channeling results. Diode CR14 is also reverse biased by the action of T2, CR3 and CR4 when the coarse bridge is unbalanced. The tuning operation stops when preselector jump switch S8 is in the correct position, the coarse bridge is balanced, and the fine bridge is balanced.

Since the coarse shaft (see figure 70) makes four revolutions for one revolution of the preselector tuning drive, there are four places where the coarse and fine bridges could be balanced during one tuning cycle. The jump switches and the X-Y control amplifier prevent the channeling operation from stopping in the wrong portion of the tuning cycle. The X-Y control amplifier applies d-c voltages to the anodes of diodes CR5 and CR6, and CR7 and CR8. Polarity of the d-c voltage is determined by the type (X or Y) of channel selected. If the X-Y control is in the X condition (open), Q5 is cut off and a positive voltage is applied to the anodes of diodes CR5 and CR6 and to the base of Q6. Transistor Q6 is saturated and a negative voltage is applied to the anodes of diodes CR7 and CR8. If the X-Y control is in the Y condition (grounded), Q5 is saturated and a negative voltage is applied to the anodes of CR5 and CR6 and to the base of Q6. Transistor Q6 is cut off and a positive voltage is applied to the anodes of CR7 and CR8.

During the first 1/8 rotation of the preselector jump switch (channels 1X through 63X), -18 volts is applied through the coarse and fine jump switches and resistors R8 and R10 to the cathodes of CR15 and CR17. If the X-Y controls is in the X position (positive voltage at anode of CR5 and negative at anode of CR7), the voltage at the cathode of CR15 is positive and the voltage at the cathode of CR17 is negative. Since contact F on S8 is open during this portion of the cycle, the negative voltage at the cathode of CR17 is not applied to the rectifier. The



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Electrical Tuning Circuits (P/O Module A2A1), Simplified Schematic Diagram
Figure 74

channeling process is complete if the bridges are balanced in this segment. If the X-Y control is in the Y condition (anode of CR5 negative, anode of CR7 positive) the cathode of CR15 is negative and the cathode of CR17 is positive. Since contact C on S8 is connected to contact D during this portion of the tuning cycle, the negative voltage from the cathode of CR15 is applied to the cathodes of diodes CR1, CR2, CR3 and CR4 to reverse bias CR14 and result in a continuation of the tuning process.



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During the portion of the tuning cycle between $1/8$ and $1/4$ revolution of S8 (channels 64Y through 126Y), -18 volts is applied to the cathode of CR16 and CR18 through fine and coarse jump switches S3 and S4 and resistors R9 and R11. The voltage at the cathode of CR16 is then negative if a Y channel is selected, and the voltage at the cathode of CR18 is negative if an X channel is selected. Since contact E on S8 is open during this segment of the tuning cycle, the X-Y control must be in the Y position to permit balanced bridges to stop the channeling operation in this portion of the cycle.

During the portion of the tuning cycle between $1/4$ and $3/8$ revolution of S8, -18 volts is applied to the cathodes of CR15 and CR17 through S3 and S4 and resistors R8 and R10. Since both contacts C and F of S8 are connected to contact D, channeling cannot stop during this portion of the tuning cycle.

During the portion of the tuning cycle between $3/8$ and $1/2$ revolution of S8, -18 volts is applied to the cathodes of CR16 and CR18 through S3 and S4 and resistors R9 and R11. Since contacts B and E of S8 are both connected to contact D during this portion of the channeling cycle, channeling cannot stop if the X-Y control is in either the X or Y condition.

During the portion of the tuning cycle between $1/2$ and $5/8$ revolution of S8 (channels 1Y through 63Y), -18 volts is applied to the cathodes of CR15 and CR17 through S3 and S4 and resistors R8 and R10. If the X-Y control is in the Y condition (positive voltage at anode of CR7 and negative at anode of CR5), the voltage at the cathode of CR15 is negative and the voltage at the cathode of CR17 is positive. Since contact C of S8 is open during this segment of the tuning cycle, channeling will stop if the bridges balance. If the X-Y control is in the X condition (anode of CR5 positive and anode of CR7 negative), the voltage at the cathode of CR15 is positive, and the voltage at the cathode of CR17 is negative. Since contact F of S8 is connected during this portion of the tuning cycle, the negative voltage at the anode of CR17 causes channeling through this portion of the cycle. Therefore, balanced bridges cannot stop the channeling during this portion of the cycle unless the X-Y control is in the Y position.

During the portion of the tuning cycle between $5/8$ and $3/4$ revolution of S8 (channels 64X through 126X), -18 volts is applied to the cathodes of CR16 and CR18 through S3 and S4 and resistors R9 and R11. If the X-Y control is in the X condition (positive voltage at anode of CR6 and negative voltage at anode of CR8), the voltage at the cathode of CR16 is positive, and the voltage at the cathode of CR18 is negative. Since contact B of S8 is open during this portion of the tuning cycle, channeling is allowed to stop if the bridges balance. If the X-Y control is in Y condition (positive voltage at anode of CR8 and negative voltage at anode of CR6), the voltage at the cathode of CR16 is negative, and the voltage at the cathode of CR18 is positive. Since contact E of S8 is closed during this portion of the tuning cycle, the negative voltage at the cathode of CR16 is coupled to the anode of CR14 to result in a continuation of channeling. Balanced bridges, therefore, cannot stop the channeling during this portion of the tuning cycle unless the X-Y control is in the X condition.

During the portion of the cycle between $3/4$ and $7/8$ revolution of S8, -18 volts is applied to the cathodes of CR15 and CR17. Since both contacts F and C of S8 are connected to contact D during this portion of the tuning cycle, a negative voltage



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is coupled to the anode of CR14 if the X-Y control is in either condition. Therefore, balanced bridges cannot stop the channeling during this segment of the tuning cycle.

During the portion of the tuning cycle between 7/8 and 1 revolution of S8, -18 volts is applied to the cathodes of CR16 and CR18. Since both contacts E and B of S8 are connected to contact D during this portion of the tuning cycle, a negative voltage is coupled to the anode of CR14 if the X-Y control is in either condition. Therefore, balanced bridges cannot stop the channeling during this segment of the tuning cycle.

The resistive bridges are excited by a-c voltages and the outputs of the bridges are rectified to produce an error signal which is independent, in polarity, from the bridge. This prevents the error signal output of one bridge from canceling the output of the other bridge and producing a false null.

Diode CR23 and resistor R62 shunt, to ground, any switching transients which are generated when relay K1 operates.

3. Modulator Control. (Refer to figure 78.)

When relay K1 is energized, during channeling operation, -18 volts d-c is applied through contacts 4 and 3 of K1 to the modulator control circuits. To ensure modulator deactivation during channeling, the -18 volts d-c is also applied to the modulator control circuits through contacts 3 and 7 of the preselector jump switch S8. See paragraph 6.0 for the operation of the modulator control circuits.

4. Range Limit Switch (Refer to figure 78.)

Switches S5 and S6 operate together to provide a short between pins J2-29 and J2-30 on all long range channels. Long range channels are all channels except 17 through 56, inclusive. On all short range channels (17 through 56), pins J2-29 and J2-30 are open.

5. Odd/Even Switch. (Refer to figure 78.)

Switch S7 is driven by the fine shaft and provides a short circuit between pins J2-27 and J2-28 on all odd-numbered channels. Pins J2-27 and J2-28 are open on all even-numbered channels.

TRANSISTOR	PARAGRAPH	PAGE	TRANSISTOR	PARAGRAPH	PAGE
A1Q1	6.S.(2)(c)	100AF	A1Q7	6.S.(2)(a)	100AF
A1Q2	6.S.(2)(c)	100AF	A1Q8	6.S.(3)	100AG
A1Q3	6.S.(2)(c)	100AF	A1Q9	6.S.(3)	100AG
A1Q4	6.S.(2)(a)	100AF			
A1Q5	6.S.(2)(a)	100AF	A2A1Q1	6.T.	100AH
A1Q6	6.S.(2)(a)	100AF	A2A1Q2	6.T.	100AH

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TRANSISTOR	PARAGRAPH	PAGE	TRANSISTOR	PARAGRAPH	PAGE
A2A1Q3	6.T.	100AH	A3Q8	6.E. (2) (i)	55
A2A1Q4	6.T.	100AH	A3Q9	6.E. (2) (i)	55
A2A1Q5	6.T.	100AH	A3Q10	6.E. (2) (h)	55
A2A1Q6	6.T.	100AH	A3Q11	6.E. (2) (i)	55
A2A1Q7	6.A. (2) (c)	34	A3Q12	6.E. (2) (g)	55
A2A1Q8	6.A. (2) (a)	32	A3Q13	6.E. (2) (g)	55
A2A1Q9	6.A. (2) (b)	33	A3Q14	6.E. (2) (l)	59
			A3Q15	6.E. (2) (j)	57
A2A2Q1	6.B. (3) (b)	37	A3Q16	6.E. (2) (k)	57
A2A2Q2	6.B. (3) (c)	37	A3Q17	6.E. (2) (k)	57
A2A2Q3	6.B. (3) (d)	37	A3Q18	6.E. (2) (k)	57
A2A2Q4	6.B. (3) (d)	37	A3Q19	6.G. (2) (b)	63
A2A2Q5	6.B. (3) (d)	37	A3Q20	6.G. (2) (c)	63
A2A2Q6	6.B. (3) (e)	37	A3Q21	6.G. (2) (d)	64
A2A2Q7	6.B. (3) (e)	37	A3Q22	6.G. (2) (d)	64
A2A2V1	6.B. (3) (g)	38	A3Q23	6.G. (2) (e)	65
A2A3V1	6.C.	38	A3Q24	6.G. (2) (f)	65
A2A3V2	6.C.	38	A3Q26	6.G. (2) (f)	65
A2A3V3	6.C.	38	A3Q27	6.G. (2) (f)	65
A2A3V4	6.C.	38	A3Q28	6.F. (2) (a)	60
			A3Q29	6.F. (2) (b)	60
A2A4Q1	6.J. (2) (a)	79	A3Q30	6.F. (2) (c)	61
A2A4Q2	6.J. (2) (c)	80	A3Q31	6.F. (2) (c)	61
A2A4Q3	6.J. (2) (b)	80	A3Q32	6.F. (2) (c)	61
A2A6Q1	6.D. (2) (d)	44	A3Q33	6.F. (2) (c)	61
A2A6Q2	6.D. (2) (d)	44			
A2A6Q3	6.D. (2) (d)	44	A4Q1	6.H.	66
A2A6Q4	6.D. (2) (d)	44	A4Q2	6.H.	66
A2A6Q5	6.D. (2) (f)	47	A4Q3	6.I. (3) (a)	68
A2A6Q6	6.D. (2) (g)	47	A4Q4	6.I. (3) (a)	68
A2A6Q7	6.D. (2) (g)	47	A4Q5	6.I. (3) (a)	68
A2A6Q8	6.D. (2) (e)	46	A4Q6	6.I. (3) (b)	69
A2A6Q9	6.D. (2) (i)	49	A4Q7	6.I. (3) (b)	69
A2A6Q10	6.D. (2) (i)	49	A4Q8	6.I. (3) (c)	71
A2A6Q11	6.E. (2) (l)	59	A4Q9	6.I. (3) (a)	68
			A4Q10	6.I. (3) (d)	71
A3Q1	6.E. (2) (a)	50	A4Q11	6.I. (3) (d)	71
A3Q2	6.E. (2) (b)	50	A4Q12	6.I. (3) (b)	69
A3Q3	6.E. (2) (c)	50	A4Q13	6.I. (3) (b)	69
A3Q4	6.E. (2) (d)	53	A4Q14	6.I. (3) (d)	71
A3Q5	6.E. (2) (e)	54	A4Q15	6.K. (3) (f)	87
A3Q6	6.E. (2) (e)	54	A4Q16	6.K. (3) (f)	87
A3Q7	6.E. (2) (f)	55	A4Q17	6.K. (3) (f)	87

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TRANSISTOR	PARAGRAPH	PAGE	TRANSISTOR	PARAGRAPH	PAGE
A4Q18	6.K. (3) (f)	87	A6Q14	6.M.	97
A4Q19	6.K. (3) (f)	87	A6Q15	6.M.	97
A4Q20	6.K. (3) (g)	89	A6Q16	6.M.	97
A4Q201	6.Q.	100Z	A6Q17	6.M.	97
A4Q202	6.Q.	100Z	A6Q18	6.M.	97
			A6Q19	6.M.	97
A5Q1	6.K. (3) (a)	83	A6Q20	6.L. (2) (a)	93
A5Q2	6.K. (3) (a)	83	A6Q21	6.N. (3) (c)	100N
A5Q3	6.I. (3) (h)	74	A6Q22	6.N. (3) (a)	100H
A5Q4	6.I. (3) (j)	78	A6Q23	6.N. (3) (a)	100H
A5Q5	6.K. (3) (b)	84	A6Q24	6.M.	97
A5Q6	6.K. (3) (b)	84	A6Q25	6.L. (2) (b)	97
A5Q7	6.I. (3) (i)	74	A6Q26	6.L. (2) (b)	94
A5Q8	6.I. (3) (i)	74			
A5Q9	6.I. (3) (k)	78	A7Q1	6.O.	100P
A5Q10	6.I. (3) (g)	73	A7Q2	6.O.	100P
A5Q11	6.I. (3) (g)	73	A7Q3	6.O.	100P
A5Q12	6.I. (3) (f)	73	A7Q4	6.P.	100V
A5Q13	6.K. (3) (c)	85	A7Q5	6.P.	100V
A5Q14	6.K. (3) (c)	85	A7Q6	6.P.	100V
A5Q15	6.K. (3) (d)	86	A7Q7	6.P.	100V
A5Q16	6.K. (3) (d)	86	A7Q8	6.P.	100V
A5Q17	6.I. (3) (e)	72	A7Q9	6.P.	100V
A5Q18	6.I. (3) (e)	72	A7Q10	6.O.	100P
A5Q19	6.I. (3) (e)	727	A7Q11	6.N. (3) (b)	100L
A5Q20	6.I. (3) (e)	72	A7Q12	6.N. (3) (b)	100L
A6Q1	6.K. (3) (i)	90	A7Q13	6.L. (2) (c)	94
A6Q2	6.K. (3) (i)	90	A7Q14	6.L. (2) (c)	94
A6Q3	6.K. (3) (i)	90	A7Q15	6.L. (2) (c)	94
A6Q4	6.K. (3) (l)	91	A7Q16	6.L. (2) (c)	94
A6Q5	6.K. (3) (l)	91	A7Q17	6.L. (2) (c)	94
A6Q6	6.K. (3) (k)	91	A7Q18	6.P.	100V
A6Q7	6.K. (3) (k)	91	A7Q19	6.N. (3) (b)	100L
A6Q8	6.M.	97	A7Q20	6.N. (3) (b)	100L
A6Q9	6.M.	97	A7Q21	6.R.	100AB
A6Q10	6.M.	97	A7Q22	6.R.	100AB
A6Q11	6.M.	97	A7Q23	6.R.	100AB
A6Q12	6.M.	97	A7Q24	6.R.	100AB
A6Q13	6.M.	97	A7Q25	6.R.	100AB

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Figure 75



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TEST POINT	PARAGRAPH	PAGE	TEST POINT	PARAGRAPH	PAGE
A2A2J4	6.B. (3) (e)	37	A4J10	6.K. (3) (f)	87
A2A2J5	6.B. (3) (g)	38	A4J11	GROUND.	
A2A3J1	6.C.	38	A5J1	6.I. (3) (k)	78
A2A3J2	6.C.	38	A5J2	6.I. (3) (h)	74
A2A3J3	6.C.	38	A5J3	6.I. (3) (f)	73
A2A3J4	6.C.	38	A5J4	6.I. (3) (j)	78
A2A6J1	6.D. (2) (i)	49	A5J5	6.K. (3) (b)	84
A2A6J2	6.D. (2) (d)	49	A5J6	6.K. (3) (a)	83
A2A6J3	6.D. (2) (i)	49	A5J7	6.K. (3) (h)	89
A2A6J4	6.D. (2) (d)	44	A5J8	6.K. (3) (d)	86
A2A6J5	6.D. (2) (i)	49	A5J9	6.I. (3) (f)	73
A2A6J6	6.D. (2) (h)	47	A5J10	6.I. (3) (k)	78
A2A6J7	6.D. (2) (d)	44	A5J11	6.K. (3) (c)	85
A3J1	6.E. (2) (j)	57	A6J1	6.K. (3) (l)	91
A3J2	6.E. (2) (d)	53	A6J2	6.K. (3) (k)	91
A3J3	6.E. (2) (e)	54	A6J3	6.M. (2) (c)	100F
A3J4	6.E. (2) (i)	55	A6J4	6.K. (3) (i)	91
A3J5	6.E. (2) (l)	59	A6J5	6.L. (2) (b)	94
A3J6	6.G. (2) (e)	65	A6J6	6.L. (2) (b)	94
A3J7	6.E. (2) (k)	57	A6J7	6.M. (2) (c)	100F
A3J8	6.G. (2) (c)	63	A6J8	6.M. (2) (c)	100F
A3J9	6.F. (2) (c)	61	A6J9	6.M. (2) (c)	100F
A3J10	6.F. (2) (c)	61	A6J10	6.N. (3) (d)	100P
A3J11	6.F. (2) (c)	61	A6J11	6.M. (2) (c)	100F
A4J1	6.I. (3) (a)	68	A7J1	6.N. (3) (d)	100P
A4J2	6.H.	66	A7J2	6.O. (3)	100U
A4J3	6.I. (3) (c)	71	A7J3	6.O. (3)	100U
A4J4	6.I. (3) (b)	69	A7J4	6.O. (3)	100U
A4J5	6.I. (3) (d)	71	A7J5	6.P. (2) (d)	100Z
A4J6	6.I. (3) (d)	71	A7J6	6.P. (2) (d)	100Z
A4J7	6.I. (3) (b)	69	A7J7	6.P. (2) (d)	100Z
A4J8	6.K. (3) (f)	87	A7J8	6.L. (2) (c)	94
A4J9	6.K. (3) (g)	89	A7J9	6.L. (2) (d)	97
			A7J10	6.L. (2) (c)	94
			A7J11	6.L. (2) (b)	94

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ADJUSTMENT	PARAGRAPH	PAGE	ADJUSTMENT	PARAGRAPH	PAGE
A1R4	6.S. (2) (c)	100AF	A2A5C1	6.D. (2) (c)	44
A1R9	6.S. (2) (a)	100AF	A2A5Z1	6.D. (2) (b)	44
A1R17	6.S. (3)	100AG	A2A5Z2	6.D. (2) (b)	44
			A2A5Z3	6.D. (2) (b)	44
A2A1C3	6.A. (2) (c)	34			
A2A1C10	6.A. (2) (a)	32	A2A6C4	6.D. (2) (d)	44
A2A1C17	6.A. (2) (b)	33	A2A6C7	6.D. (2) (d)	44
A2A1C19	6.A. (2) (d)	34	A2A6C18	6.D. (2) (d)	44
			A2A6C25	6.D. (2) (d)	44
A2A2C3	6.B. (3) (a)	36	A2A6C31	6.D. (2) (f)	47
A2A2C4	6.B. (3) (a)	36	A2A6C42	6.D. (2) (g)	47
A2A2C6	6.B. (3) (a)	36	A2A6C49	6.D. (2) (g)	47
A2A2C9	6.B. (3) (a)	36			
A2A2C12	6.B. (3) (a)	36	A3R16	6.E. (2) (e)	54
A2A2C18	6.B. (3) (b)	37	A3R63	6.G. (2) (d)	64
A2A2C19	6.B. (3) (b)	37	A3R74	6.G. (2) (f)	65
A2A2C22	6.B. (3) (c)	37	A3R89	6.F. (2) (c)	61
A2A2C23	6.B. (3) (c)	37	A3R92	6.F. (2) (c)	61
A2A2C26	6.B. (3) (d)	37			
A2A2C29	6.B. (3) (d)	37	A4R11	6.I. (3) (a)	68
A2A2C33	6.B. (3) (d)	37	A4R17	6.I. (3) (b)	69
A2A2C36	6.B. (3) (e)	37	A4R28	6.I. (3) (d)	71
A2A2C37	6.B. (3) (e)	37	A4R44	6.K. (3) (e)	86
A2A2C41	6.B. (3) (e)	37	A4R204	6.Q. (3)	100AB
A2A2C44	6.B. (3) (f)	38			
A2A2C56	6.B. (3) (d)	37	A5R14	6.K. (3) (b)	84
A2A2C58	6.B. (3) (g)	38	A5R78	6.I. (3) (e)	72
			A5R83	6.I. (3) (e)	72
A2A3C1	6.C.	38	A7R79	6.R. (3)	100AE
A2A3C4	6.C.	38			
A2A3C7	6.C.	38			
A2A3C10	6.C.	38			

Adjustment Index
Figure 77



PAGE	REVISION IDENTIFICATION	DESCRIPTION OF REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY (MCN)
100AY/ 100AZ	(A1)	R10 changed to 33 ohms, C56 changed to 5.5-18 pf.		1961
100AY/ 100AZ	(A2)	R24, 10 ohms, added.		1961
100AY/ 100AZ	(A3)	C28 changed to 6.2 pf.		1961
100AY/ 100AZ	(A4)	C57 moved, L24 changed and L28 removed.		1961
100AY/ 100AZ	(A5)	R14 changed to 82 ohms.		1961
100AY/ 100AZ	(A6)	R13 changed to 22 ohms.		1961
100AY/ 100AZ	(A7)	R23 changed to 30.1K ohms.		1845
100AY/ 100AZ	(A8)	R25 and R26 added.		1845
100AY/ 100AZ	(A9)	R18 changed to 82.5K.		1845
100BA/ 100BB	(A10)	R54 changed to 909 ohms.		1961
100BA/ 100BB	(A11)	C22 changed to 220 uf.		1961
100BA/ 100BB	(A12)	C23, 12 uf, was 13 uf.		1566
100BC/ 100BD		Added standoff J849.		1845
100BC/ 100BD		A5C12 corrected to 12 uf.		All
100BE/ 100BF		ACR23 changed to 28.7K.		1961
100BG/ 100BH		Changes made to add 200/300- mile distance mechanism module.		All
100BI/ 100BJ		New schematic to cover 200/ 300-mile distance mechanism module.		All

860E-2 Distance Measuring Equipment, Schematic Diagram (Sheet 1 of 7)

Figure 78

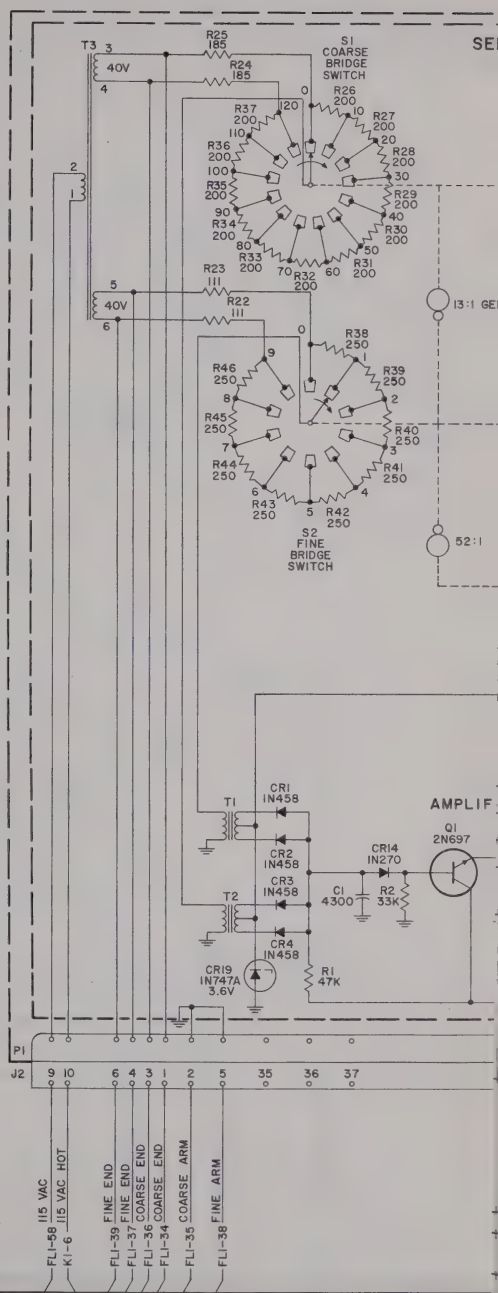
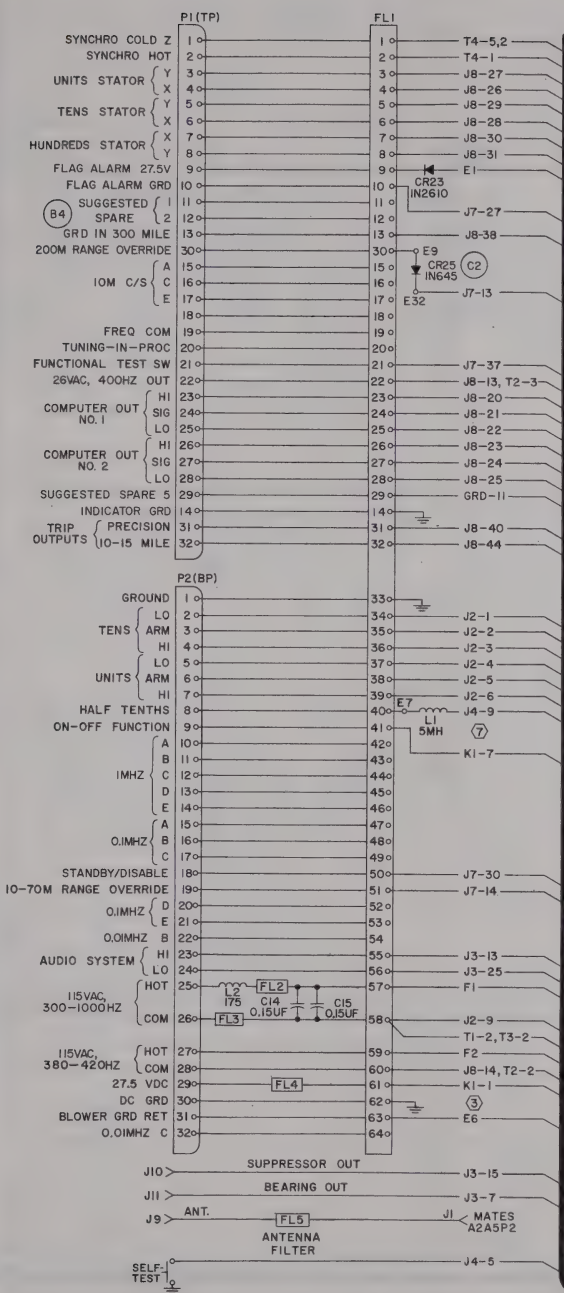
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34-46-0
Page 100AW



PAGE	REVISION IDENTIFICATION	DESCRIPTION OF REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY
100BI/ 100BJ	(B1)	Added connection from P1-38 to P1-45 in three places and reversed 1 and 3 designations on R1B.		MCN247
100BA/ 100BB	(B2)	Q15 changed from 2N337 to 2N1711.		All
100BC/ 100BD	(B3)	Q3, Q6, Q10, and Q18 changed from 2N337 to 2N1711.		All
100AY/ 100AZ	(B4)	Changed P1-13 callout from SPARE to GRD IN 300 MILE.		MCN 247
100AY/ 100AZ	(B5)	Added R24 and R25 to reduce F1 failures.		All
100BC/ 100BD	(B6)	Changed R48 from 20K to 21.5K.		MCN 3051
100BA/ 100BB	(B7)	Changed C63 from 100 to 47 pf. Changed C36 from 68 to 100 pf.		MCN 2846
100BA/ 100BB	(B8)	Added R42 between Y1 and junction of R15 and C65/C55.		MCN 2486
100AY/ 100AZ	(B9)	Added R61 between CR20-4 and C16.		MCN 2597
100BC/ 100BD	(C1)	Added C40 and changed value of R48 to improve waveshape of suppressor multivibrator.		MCN 3394
100AY/ 100AZ	(C2)	Added CR25 to extend DME override capability.	SB 30	MCN 3306
100BA/ 100BB	(C3)	Choice of each resistor R43 thru R47 or shorting strip to set if. gain.		MCN 3873
100BJ/ 100BK	(C4)	Added EPC module to eliminate locking on echo reply.	SB 31	Not available at time of publication
100AY/ 100AZ	(C5)	Changed SCR type, CR9 and CR10, to eliminate F1 failures.	SIL 40-67	MCN 3853

860E-2 Distance Measuring Equipment, Schematic Diagram (Sheet 1A of 7)
Figure 78

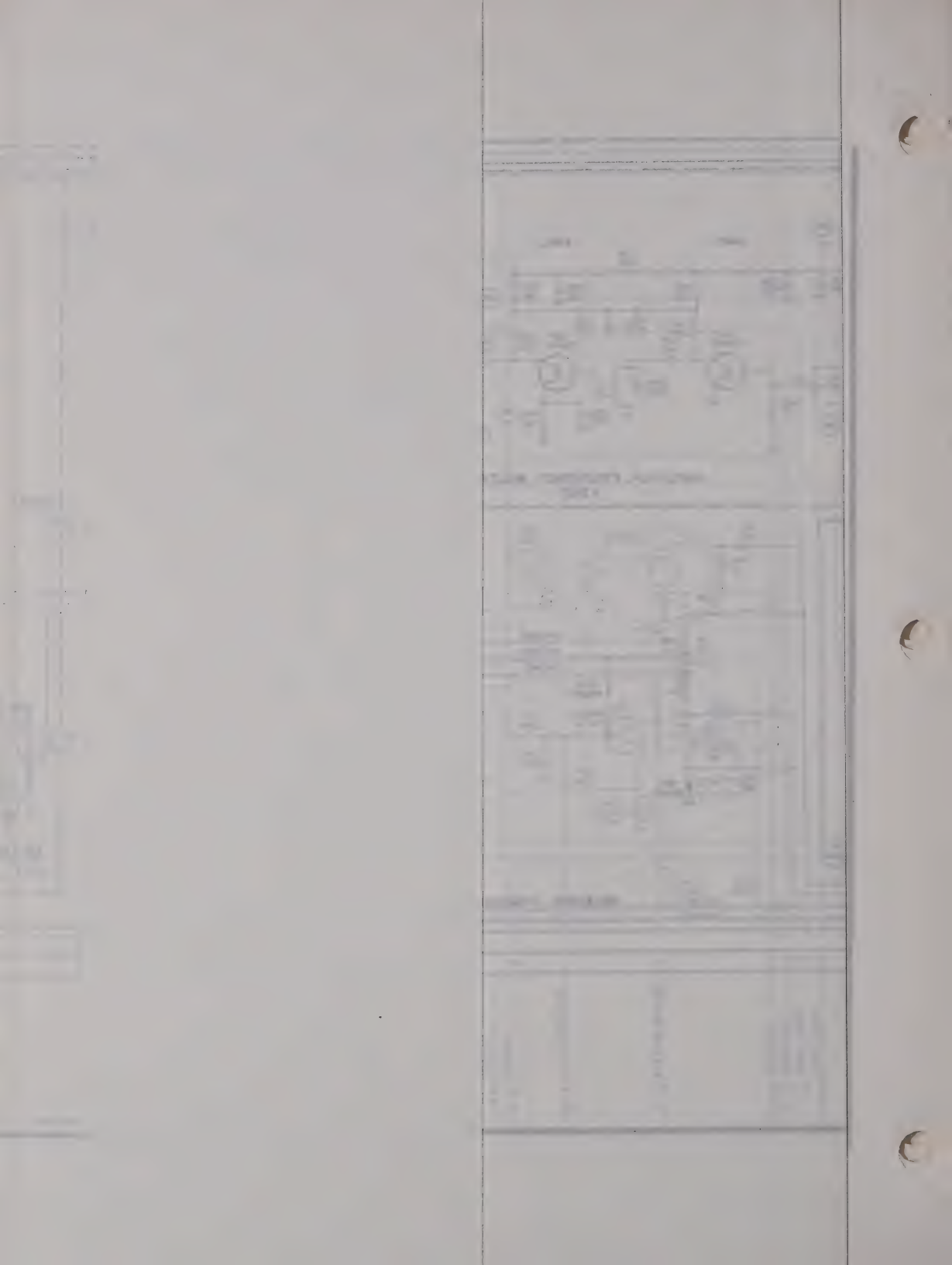


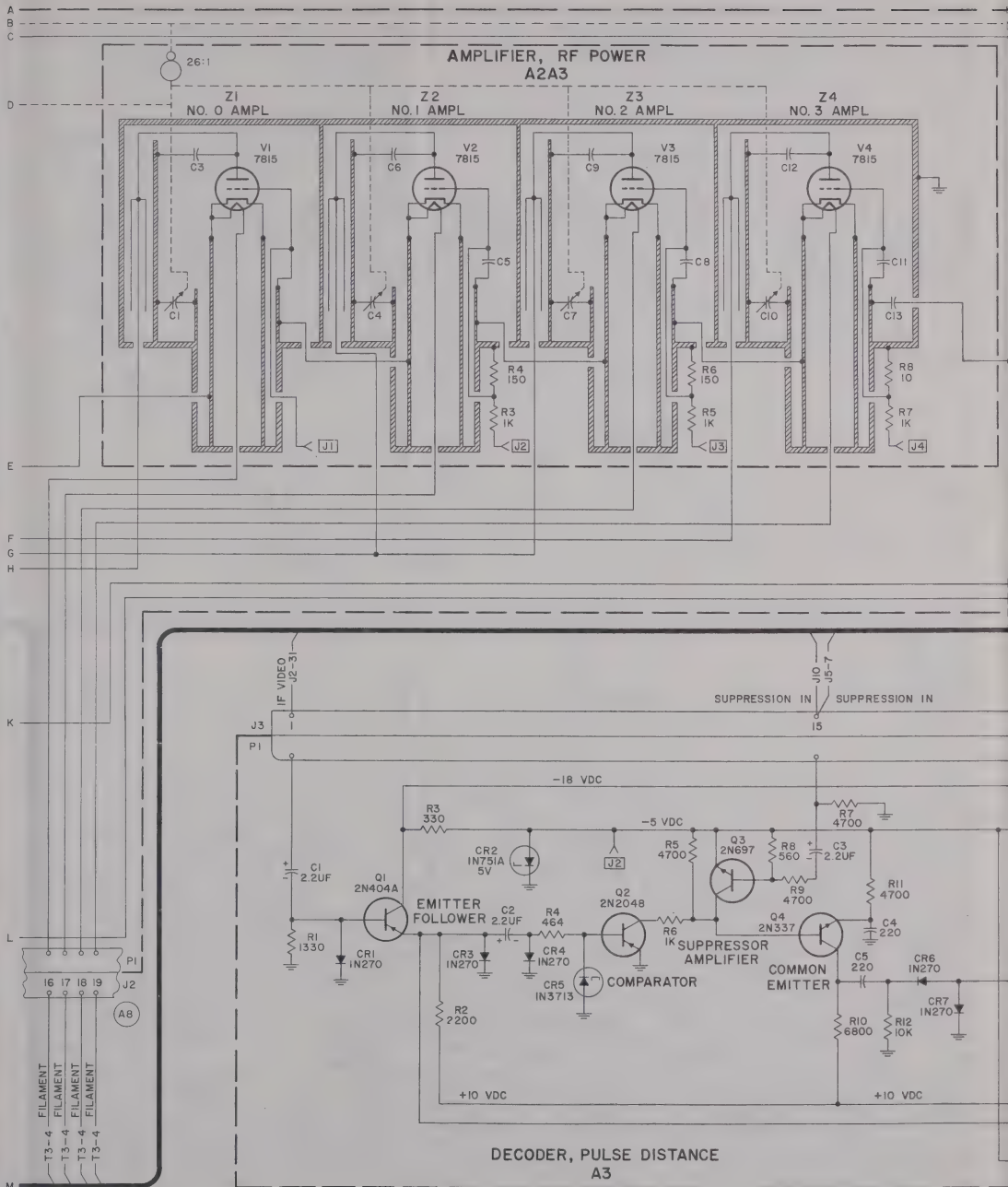
860E-2 Distance Measuring Equipment, Schematic Diagram (Sheet 2 of 7)

Figure 78

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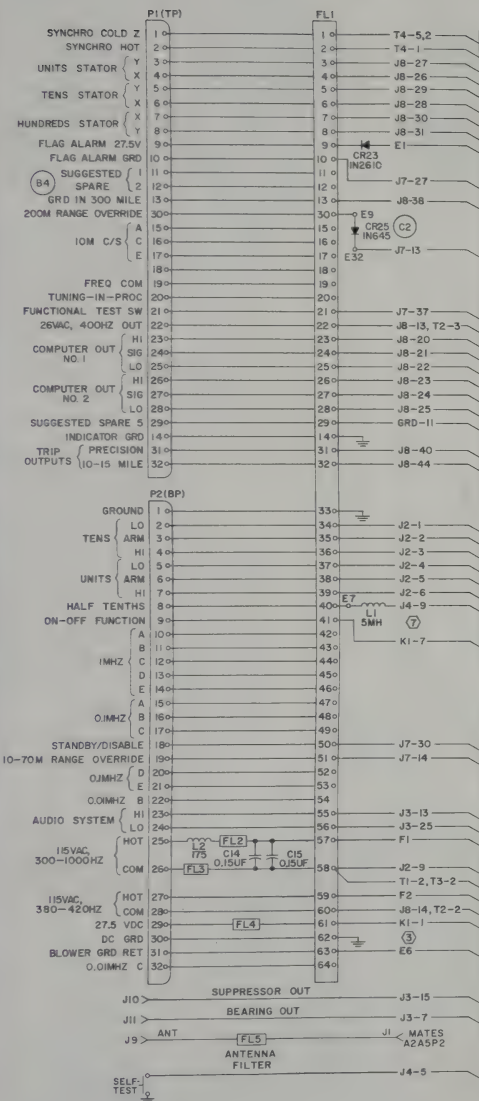
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Pages 100AY/100AZ

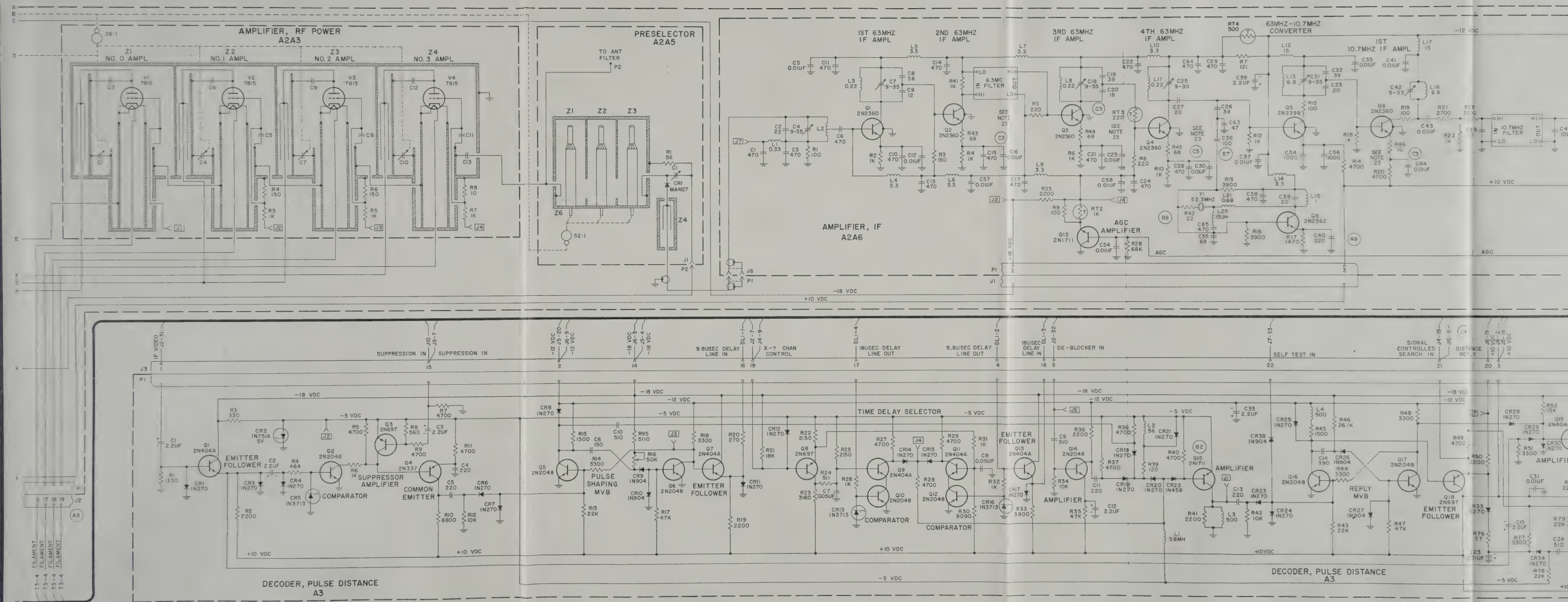




860E-2 Distance Measuring Equipment, Schematic Diagram (Sheet 3 of 7)

Figure 78

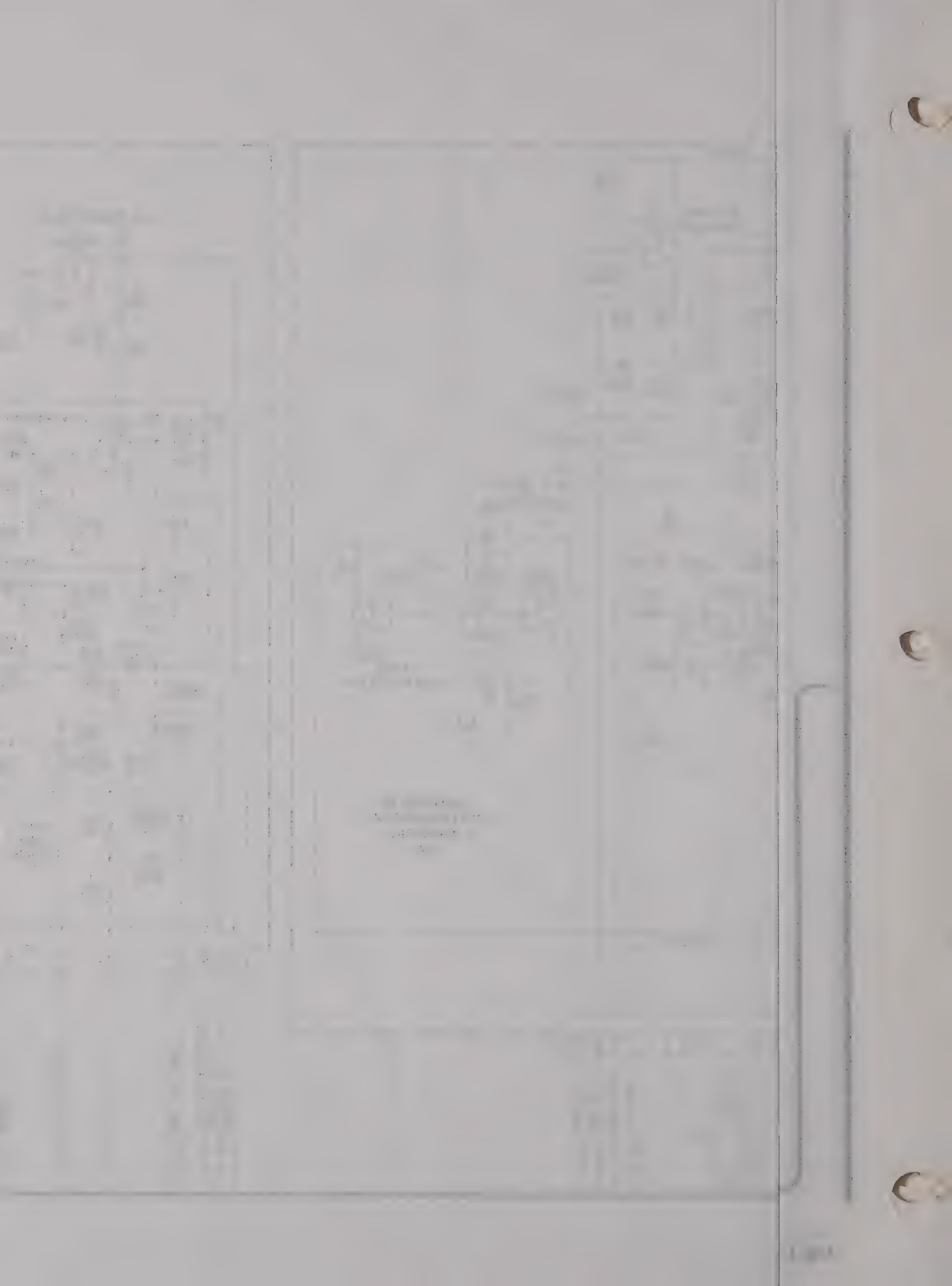


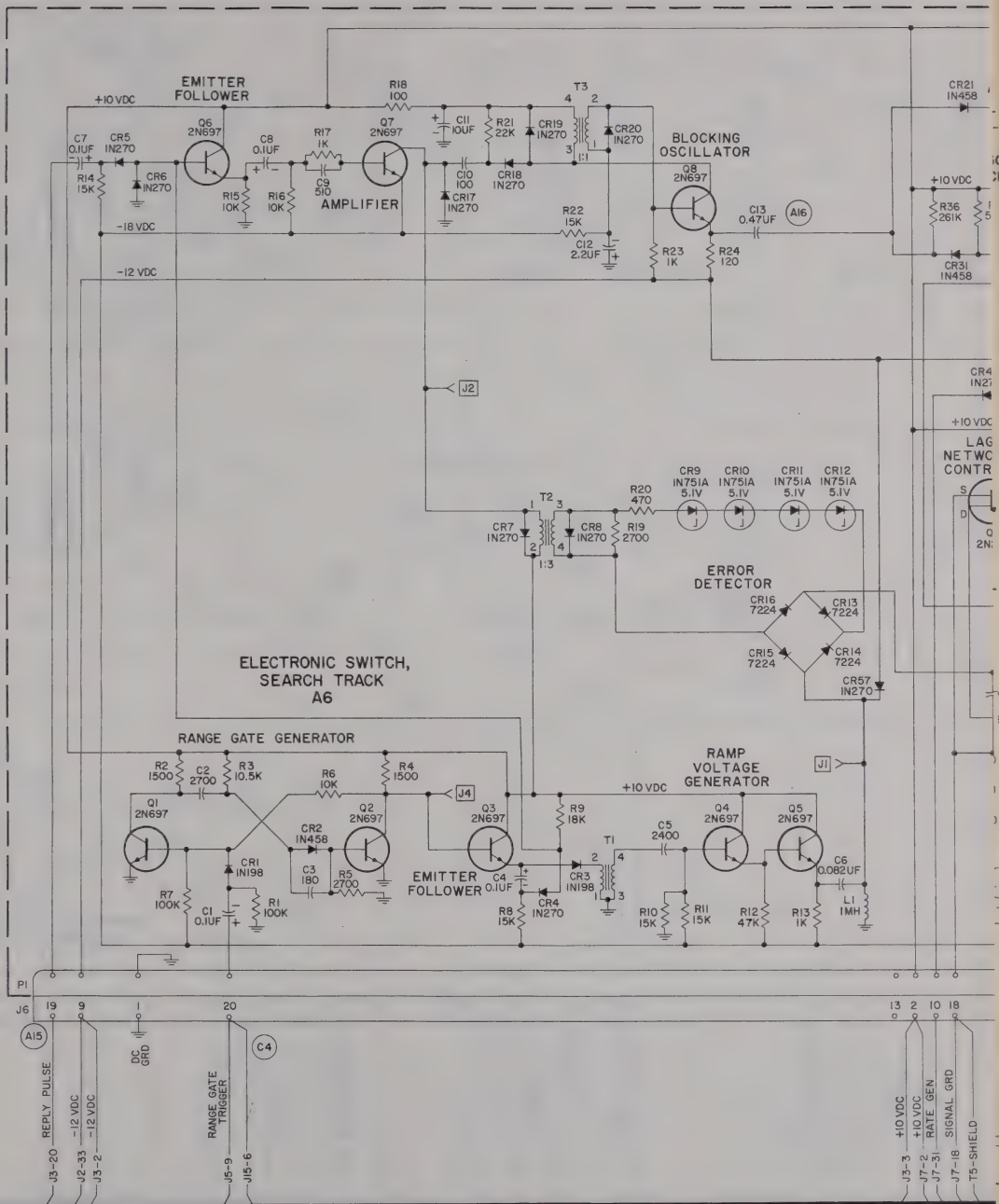






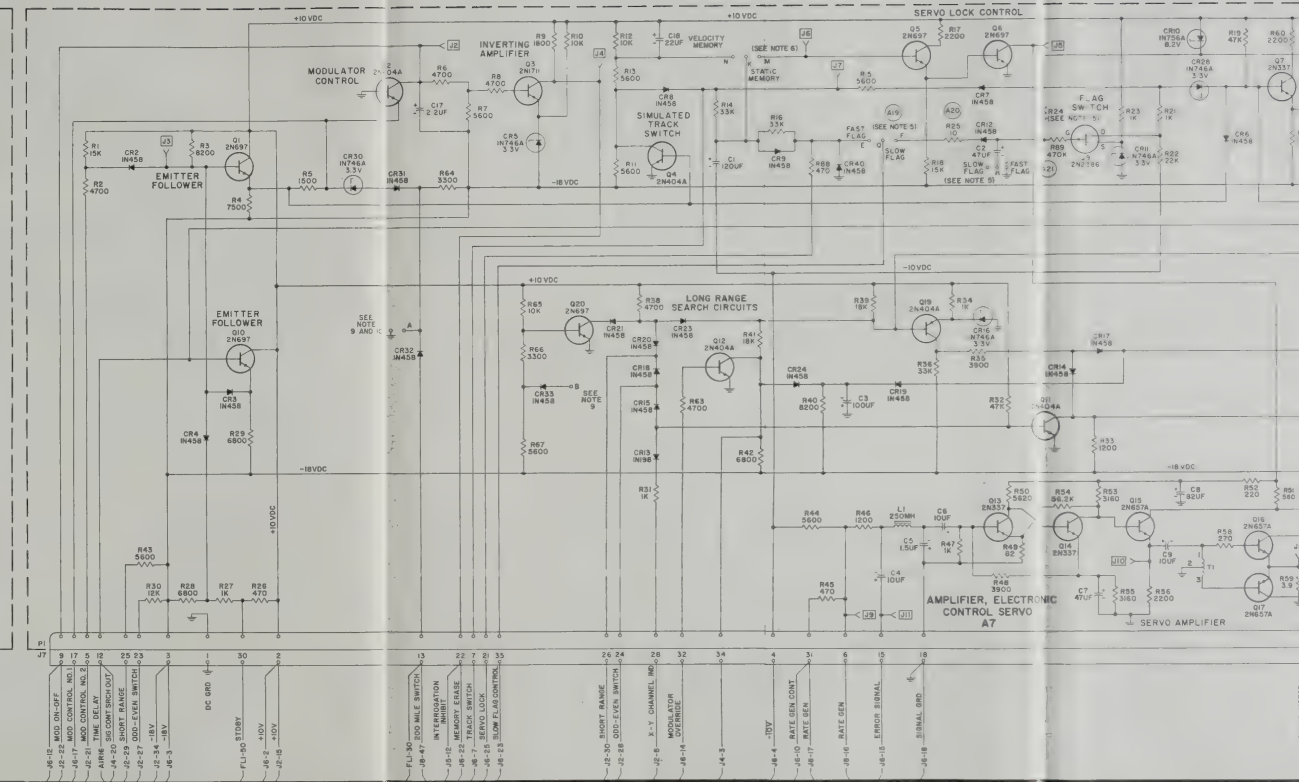
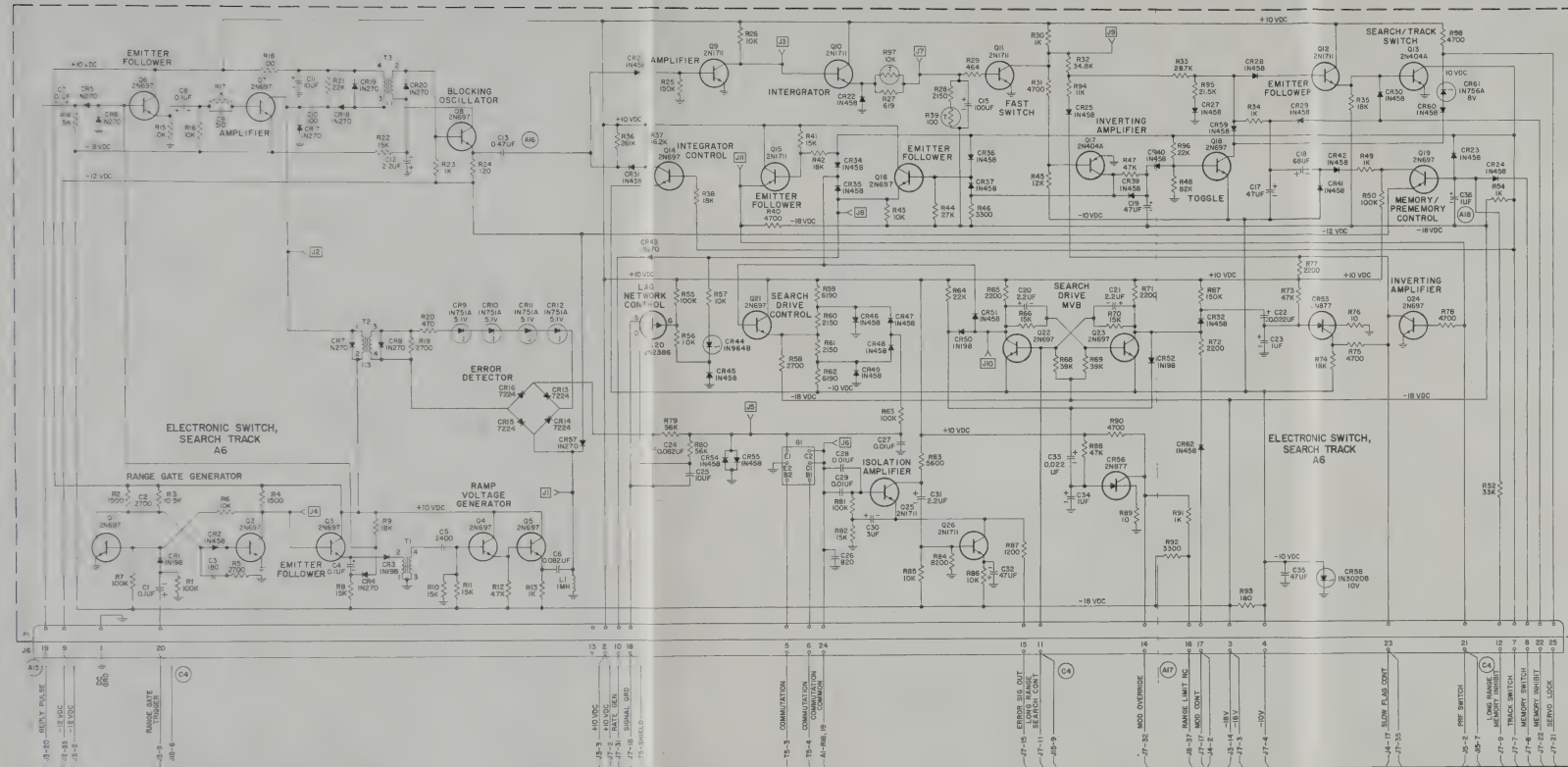




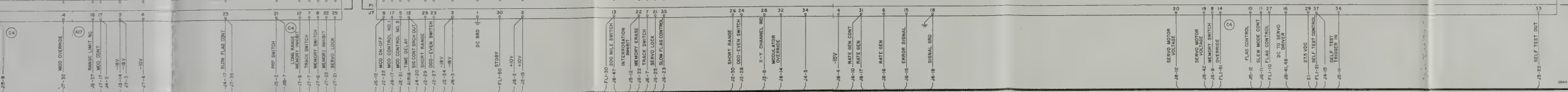
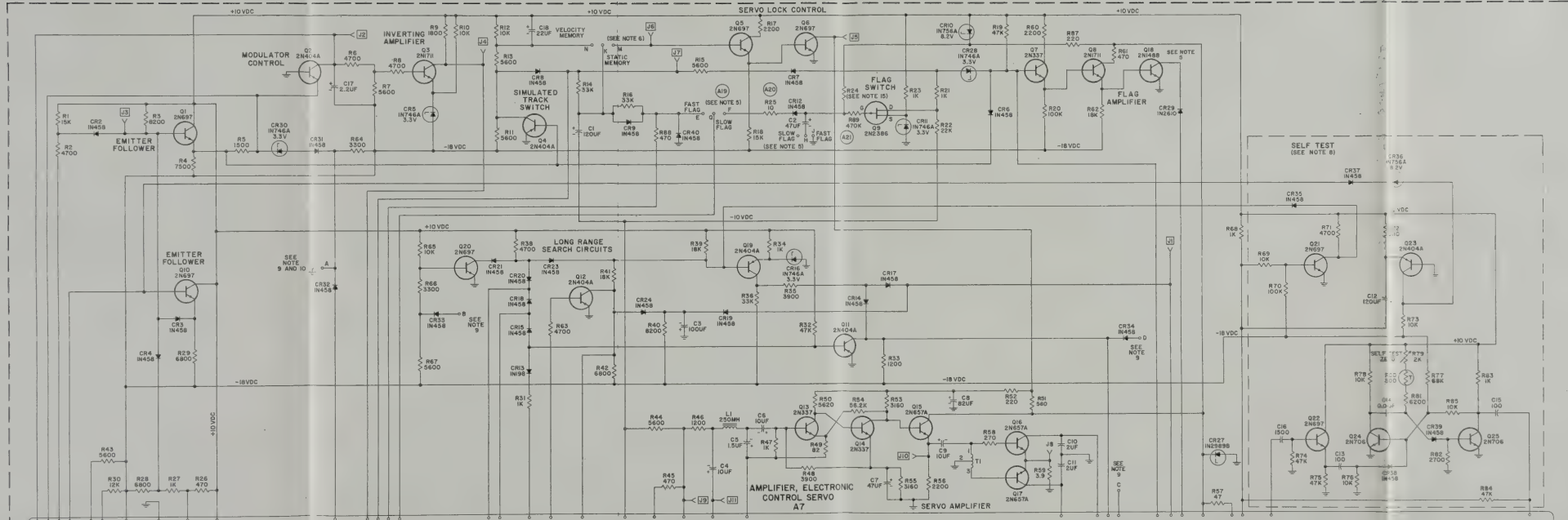
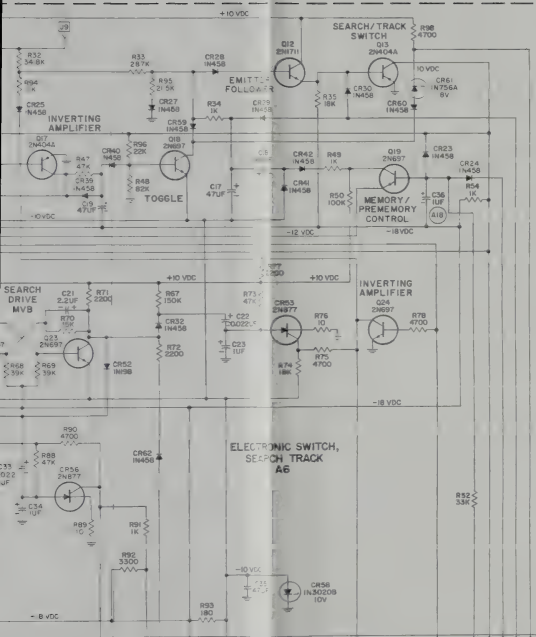


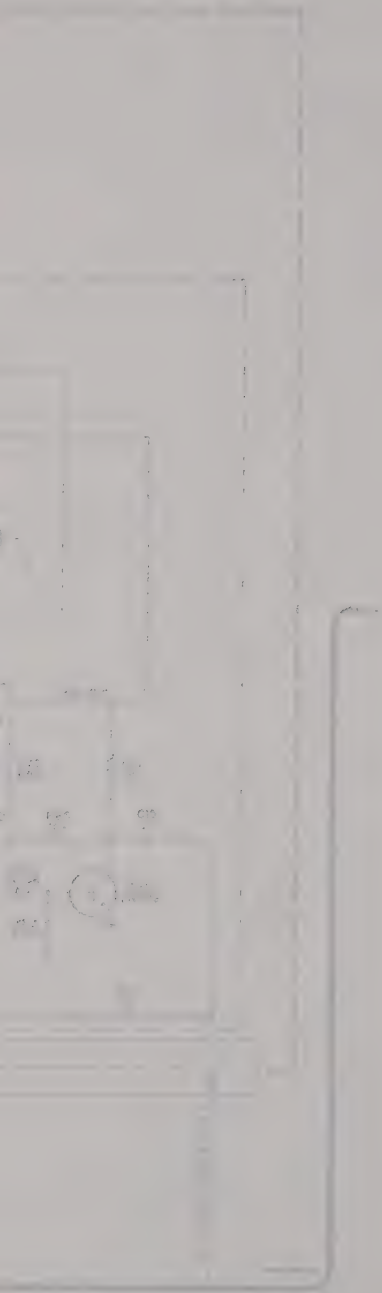
860E-2 Distance Measuring Equipment, Schematic Diagram (Sheet 5 of 7)

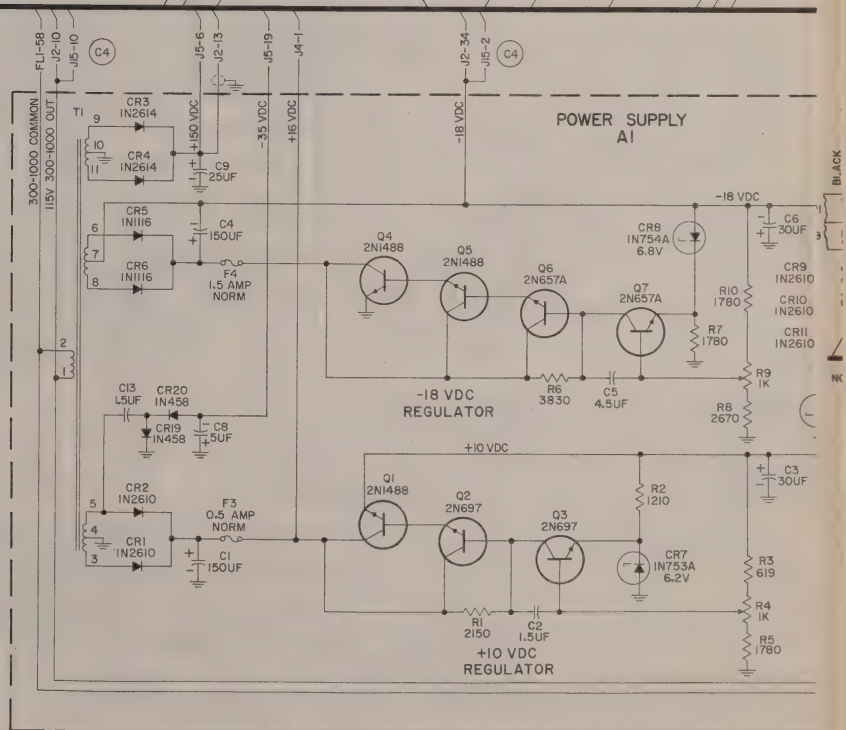
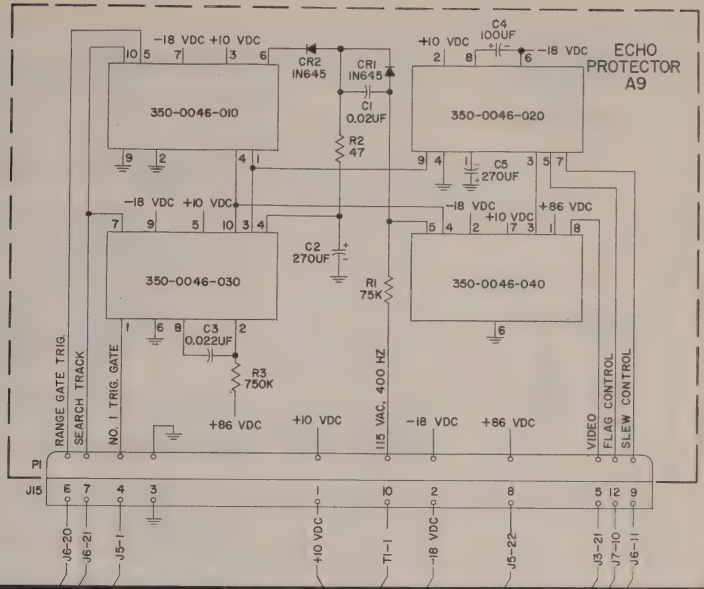
Figure 78



860E-2 Distance Measuring Equipment, Schematic Diagram (Sheet 5 of 7)











1. UNLESS OTHERWISE INDICATED, ALL RESISTANCE VALUES ARE IN OHMS, ALL CAPACITANCE VALUES ARE IN PICOFARADS AND ALL INDUCTIVE VALUES ARE IN MICROHENRYS.
2. "A" (NORMAL) CHANNELS CORRESPOND TO ARINC X CHANNELS, "B" (SPLIT) CHANNELS CORRESPOND TO ARINC Y CHANNELS.
3. CONNECTIONS SHOWN FOR OPTIONAL INTERNAL ±275 VDC SUPPLY (POSTS AT E12 THRU E15 NOT USED). FOR EXTERNAL ±275VDC SUPPLY, CONNECT W1 TO E1-51, INSTEAD OF E9. TERMINAL POSTS E12 THRU E15 USED TO TERMINATE LEADS WHEN P5, CR21, CR22 AND C12 ARE NOT INSTALLED (SEE POWER SUPPLY A1).
4. CONNECTIONS SHOWN FOR OPTIONAL POWER RELAY A1K1. WHEN NOT USED REPLACE WITH WIRED HEADER.
5. FOR FAST FLAG CONNECT PI-21 (E) TO R25 (F), AND C2 (H) TO R26 (H). (BOARD A17). FOR SLOW FLAG CONNECT PI-32 (D) TO R25 (F) AND REMOVE C2 (H) FROM GROUP (J). (BOARD A17).
6. FOR STATIC MEMORY CONNECT O5 BASE (M) TO R16-CR9 (K). FOR VELOCITY MEMORY CONNECT O5 BASE (M) TO R12-R13 (N) (BOARD A7).
7. TO ACTIVATE SPLIT CHANNEL, CONNECT FLI-40 TO E7 AS SHOWN. REMOVE JUMPER WIRE BETWEEN FLI-40 AND E7 TO DEACTIVATE SPLIT CHANNEL.
8. SELF-TEST ON BOARD AT OPTIONAL.
9. BOARD A7:
 - (a) FOR ILS NOT OVERRIDEABLE AND TYPOR OVERRIDEABLE, CONNECT CR32 CATHODE (A) TO GROUND AND CR33 ANODE (B) TO PI-14 (C).
 - (b) FOR ILS AND TYPOR ALWAYS OVERRIDE, CONNECT CR32 CATHODE (A), CR33 ANODE (B), AND CR34 ANODE (D) TO GROUND.
 - (c) FOR ILS AND TYPOR OVERRIDEABLE, CONNECT CR32 CATHODE (A) TO GROUND AND CR33 ANODE (B) TO PI-14 ANODE (D) TO PI-14 (C).
 - (d) FOR ILS OVERRIDEABLE AND TYPOR ALWAYS OVERRIDE, CONNECT CR32 (A) TO GROUND, PI-14 (C) TO CR34 ANODE (E) AND CR33 ANODE (B) TO GROUND.
10. BOARD A7:

WHEN CR32 CATHODE (A) IS GROUND, MAXIMUM RANGE IS ALWAYS 200 OR 300 MILES DEPENDING ON THE DISTANCE MECHANISM MODULE USED. WHEN A 200 MILE DISTANCE MECHANISM MODULE IS USED (A) MUST BE GROUND TO PROVIDE 200 MILES MAXIMUM RANGE. WHEN A 300 MILE DISTANCE MECHANISM MODULE IS USED, GROUND POINT (A) TO PROVIDE 300 MILES MAXIMUM RANGE OR UNGROUND (A) TO OBTAIN 200 MILE RANGE OVERRIDEABLE TO 300 MILES OVER WIRE PI-14.
11. VELOCITY MEMORY SLOW FLAG MAY NOT BE USED IN CONJUNCTION WITH DISTANCE MECHANISM WHICH INCLUDES I2 MILE PI SWITCH.
12. COMPUTER POTENTIOMETERS AS SHOWN, OPTIONAL.
13. I2 MILE PI SWITCH AS SHOWN, OPTIONAL.
14. 200 MILE RANGE LIMIT SWITCH AND 2500-4000 FOOT PI SWITCH AS SHOWN. THE RANGE PRESENTLY USED IS 2500 FEET.
15. SELECTED FOR 2-5.5 SECOND FAST FLAG RESISTANCE RANGE 56K OHMS TO 390K OHMS.
16. WHEN USED, SELECTED 2 WATT COMPOSITION RESISTOR FOR TRANSMITTER POWER REGULATOR (SEE MODULATOR 244). RESISTANCE RANGE 10 OHMS TO 82 OHMS.
17. SELECTED TO RESONATE RINGING CIRCUIT AT 1350 CPS. CAPACITANCE RANGE 240 PF TO 1000 PF.
18. RELAY K1 PIN CORRESPONDING SHOWN ON PI SKI SCHEMATIC PI SKI SOCKET

1	12
2	1
3	11
4	5
5	4
6	5
7	1
8	7
9	6
10	10
11	11
12	11

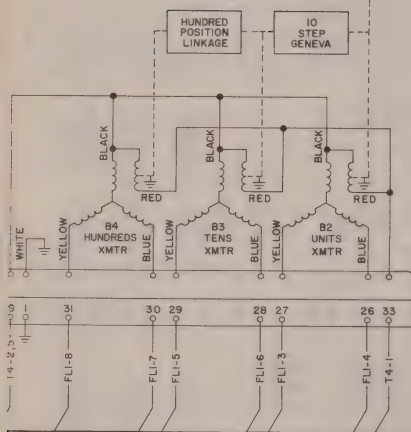
19. THE 806C-2 DMC INCLUDES EITHER A 200 OR 300 MILE DISTANCE MECHANISM MODULE. REFER TO TABLE 4A FOR AVAILABLE MODULES.
20. THE 005 STATUS 300 MILE DISTANCE MECHANISM MODULE AB IS NOT AVAILABLE TO INCLUDE THE PI SWITCH.
21. (TEST SELECT) 20K OR 215K.
22. UNITS MCM3852 AND EARLIER HAVE W30A. IMPORTANT: IF NECESSARY, IT IS RECOMMENDED THAT W30A BE USED.
23. R43, R44, R45, R46, R47 MAY BE SHORTED BY BUS BAR.

Figure 78



Figure 78

MILE DISTANCE
NISM MODULE
A8



- NOTES:
1. PHASING OF UNITS AND TENS SYNCHRO TRANSMITTERS PER ARINC "XYZ" SYSTEM
 2. ELECTRICAL SYNCHRO ZERO AS DEFINED BY ARINC ("HIGH NULL") CORRESPONDS TO 0 MILES FOR BOTH UNITS AND TENS SYNCHRO TRANSMITTERS.
 3. MINIMUM RESISTANCE OCCURS AT -3 OR 298 MILES BETWEEN PINS 3 AND 4. MINIMUM RESISTANCE OCCURS AT 0 MILES BETWEEN PINS 21 AND 22, AND PINS 24 AND 25.
 4. THIS RESISTOR IS A CUSTOMER OPTION AND MAY BE EITHER A RESISTOR OR A DUMMY RESISTOR.
 5. SHOWN AT ABOUT 5 MILES.



860E-2 Distance Measuring Equipment - Disassembly

1. GENERAL.

The following instructions include the disassembly of the 860E-2 Distance Measuring Equipment into modular form and the disassembly of each module. Keyed illustrations are included within this section as an aid in disassembling the modules.

These disassembly instructions do not contain reference to unsoldering lead wires unless required for clarity. Do not unsolder wires except where necessary. Before disturbing connections, note color coding and placement of wires.

2. DISASSEMBLY OF 860E-2 DISTANCE MEASURING EQUIPMENT.

NOTE: Set the 860E-2 Distance Measuring Equipment to channel 0 before starting disassembly procedure.

A. Removing Dust Cover.

Turn locking screw at the rear of the 860E-2 counterclockwise 120 degrees. Slide the dust cover from the unit.

B. Removing Modules. (Refer to figure 101.)

CAUTION: DO NOT TWIST OR PRY ON MODULE WHILE REMOVING IT FROM THE CHASSIS OR THE CONNECTOR MAY BE DAMAGED.

(1) Distance Mechanism Module A8.

Loosen the four red-headed captive screws that secure the distance mechanism module to the chassis. Lift the module from the 860E-2 chassis.

(2) Modules A3 through A7.

(a) Remove the locking plate which secures the modules by bowing the center of the plate away from the modules and lifting up.

(b) Starting at the left side of the 860E-2, remove the modules by grasping each with the fingers and pulling up.

(3) Receiver Transmitter Module A2.

Loosen the six red-headed captive screws (three on each side) that secure the receiver transmitter module to the chassis. Lift the module from the 860E-2 chassis.

(4) Echo Protector Circuit A9 (Installed in Late Models).

Loosen the three red-headed captive screws that secure the module to the 860E-2 chassis, and lift the EPC from the chassis.

C. Receiver Transmitter Module Disassembly.

(1) Modulator Subassembly.

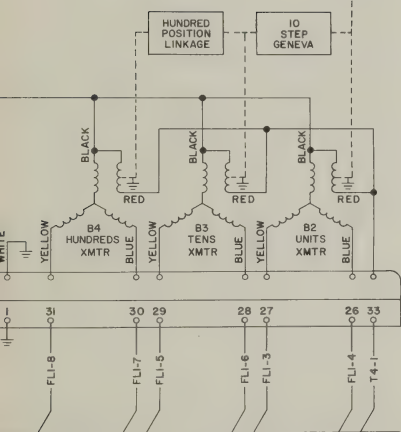
(a) Removing Modulator Subassembly. (Refer to figure 102.)

1. Loosen the four red-headed captive screws.

2. Pull unit straight out from the power amplifier subassembly.

NOTE: Avoid twisting the unit to prevent damage to the pins of connector P1.

MILE DISTANCE
ISM MODULE
A8



ES:
PHASING OF UNITS AND TENS SYNCHRO TRANSMITTERS PER
ARINC "XYZ" SYSTEM
ELECTRICAL SYNCHRO ZERO AS DEFINED BY ARINC ("HIGH NULL")
CORRESPONDS TO 0 MILES FOR BOTH UNITS AND TENS SYNCHRO
TRANSMITTERS.
MINIMUM RESISTANCE OCCURS AT -3 OR 298 MILES BETWEEN
PINS 3 AND 4. MINIMUM RESISTANCE OCCURS AT 0 MILES BETWEEN
PINS 21 AND 22, AND PINS 24 AND 25.
THIS RESISTOR IS A CUSTOMER OPTION AND MAY BE EITHER A
RESISTOR OR A DUMMY RESISTOR.
SHOWN AT ABOUT 5 MILES.



860E-2 Distance Measuring Equipment - Disassembly

1. GENERAL.

The following instructions include the disassembly of the 860E-2 Distance Measuring Equipment into modular form and the disassembly of each module. Keyed illustrations are included within this section as an aid in disassembling the modules.

These disassembly instructions do not contain reference to unsoldering lead wires unless required for clarity. Do not unsolder wires except where necessary. Before disturbing connections, note color coding and placement of wires.

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NOTE: Set the 860E-2 Distance Measuring Equipment to channel 0 before starting disassembly procedure.

A. Removing Dust Cover.

Turn locking screw at the rear of the 860E-2 counterclockwise 120 degrees. Slide the dust cover from the unit.

B. Removing Modules. (Refer to figure 101.)

CAUTION: DO NOT TWIST OR PRY ON MODULE WHILE REMOVING IT FROM THE CHASSIS OR THE CONNECTOR MAY BE DAMAGED.

(1) Distance Mechanism Module A8.

Loosen the four red-headed captive screws that secure the distance mechanism module to the chassis. Lift the module from the 860E-2 chassis.

(2) Modules A3 through A7.

(a) Remove the locking plate which secures the modules by bowing the center of the plate away from the modules and lifting up.

(b) Starting at the left side of the 860E-2, remove the modules by grasping each with the fingers and pulling up.

(3) Receiver Transmitter Module A2.

Loosen the six red-headed captive screws (three on each side) that secure the receiver transmitter module to the chassis. Lift the module from the 860E-2 chassis.

(4) Echo Protector Circuit A9 (Installed in Late Models).

Loosen the three red-headed captive screws that secure the module to the 860E-2 chassis, and lift the EPC from the chassis.

C. Receiver Transmitter Module Disassembly.

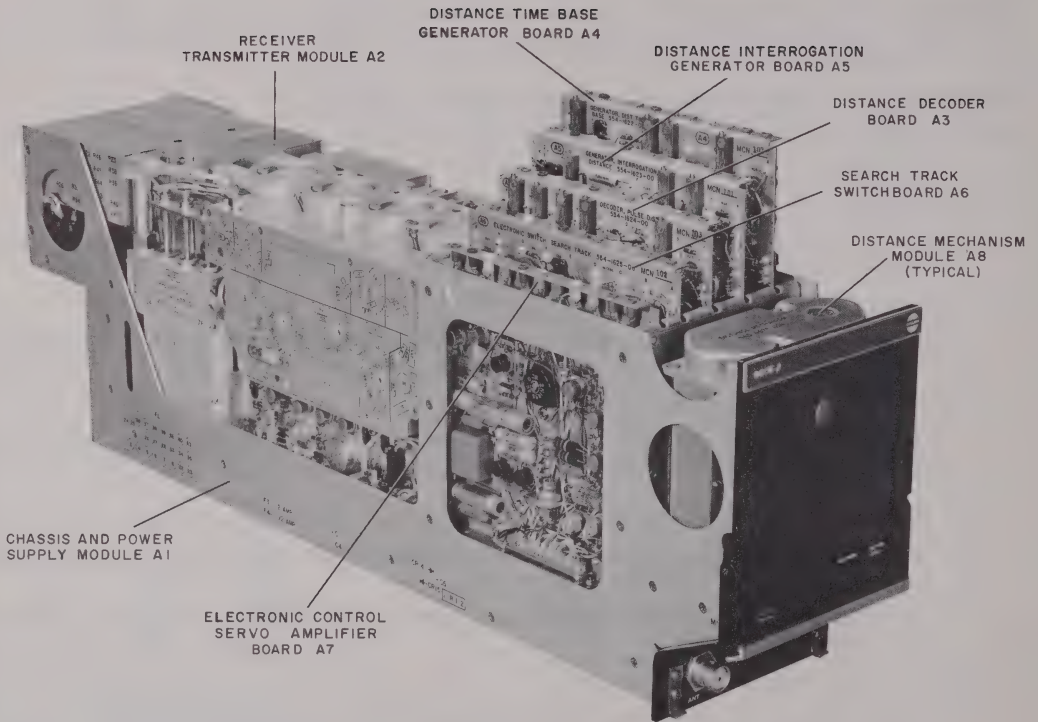
(1) Modulator Subassembly.

(a) Removing Modulator Subassembly. (Refer to figure 102.)

1. Loosen the four red-headed captive screws.

2. Pull unit straight out from the power amplifier subassembly.

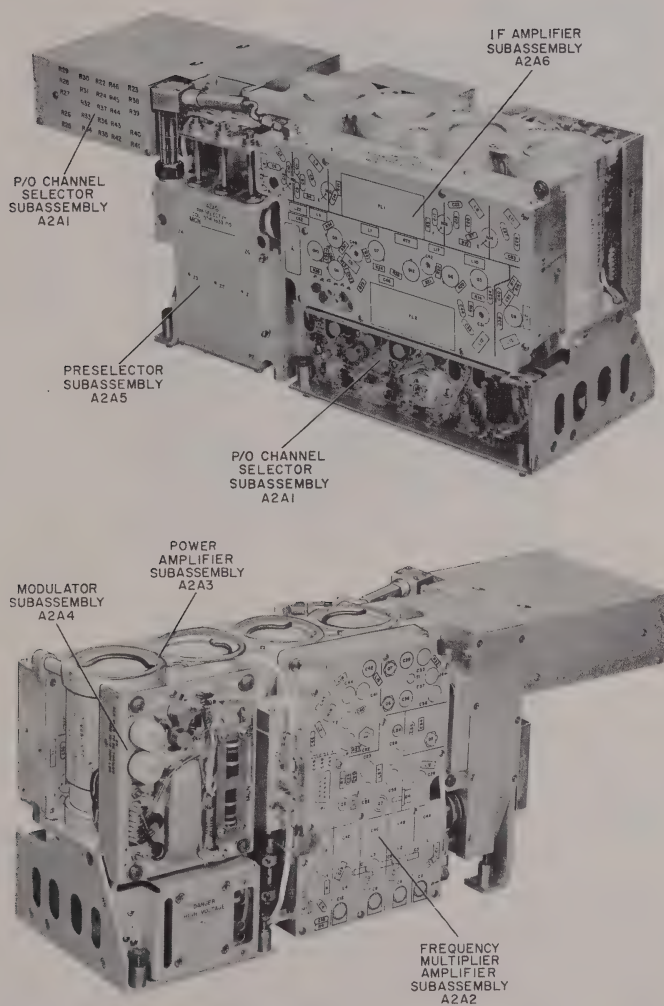
NOTE: Avoid twisting the unit to prevent damage to the pins of connector P1.



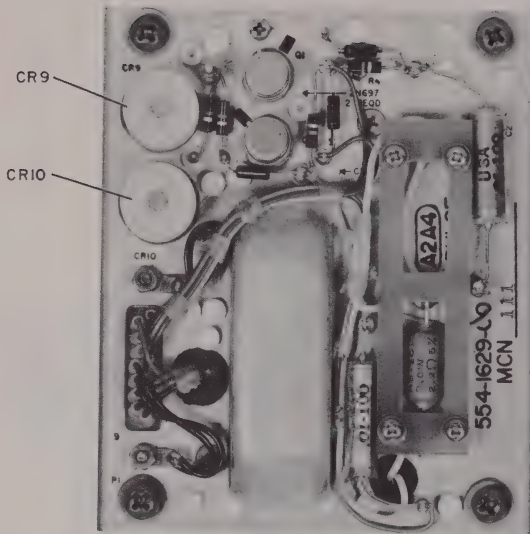
860E-2 Distance Measuring Equipment, Module Identification
Figure 101



OVERHAUL MANUAL



Receiver Transmitter Module, Subassembly Identification
Figure 102



Modulator Subassembly, Front View
Figure 103

- (b) Removing Diodes CR9 and CR10. (Refer to figure 103.)

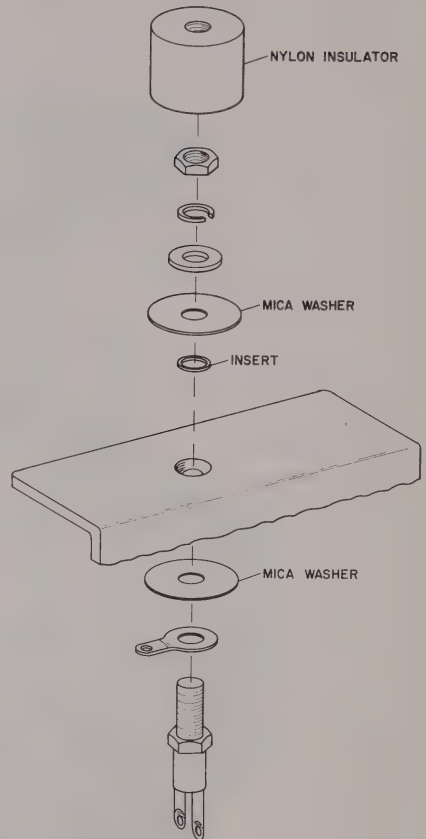
1. Unsolder leads and components, and note placement of all leads.
2. Disassemble diode. (See figure 104.)

- (c) Removing Coils L1 and L2.

1. Unsolder leads, and note their placement.
2. Remove screws, and lift bracket and coils from chassis. Dress component leads as necessary to permit removal.
3. Remove screw, and lift off coil.

- (d) Removing Capacitors C4 and C5. (Refer to figure 105.)

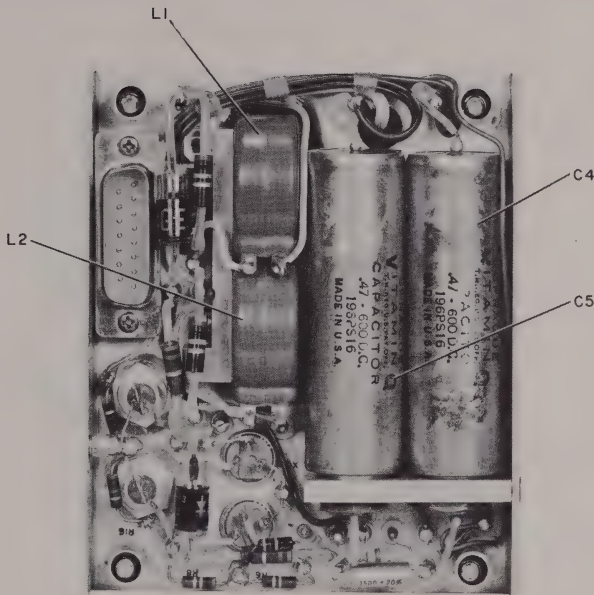
1. Unsolder leads, and note their placement.
2. Remove mounting block.
3. Remove nuts.
4. Remove capacitors.



Diode Mounting Detail
Figure 104



OVERHAUL MANUAL



Modulator Subassembly, Rear View
Figure 105

(2) Frequency Multiplier Subassembly.

(a) Removing Frequency Multiplier Subassembly. (Refer to figure 102.)

1. Disconnect connectors J1, J2 and J3. Use one wrench to hold the longer of the two nuts stationary while turning the other nut with a second wrench.
2. Loosen the four red-headed captive screws.
3. Separate the subunit from the power amplifier subassembly by pulling on the side opposite the coupling. This will free connector P1 so that the unit can be separated from the coupling.

(b) Gaining Access to Electrical Components.

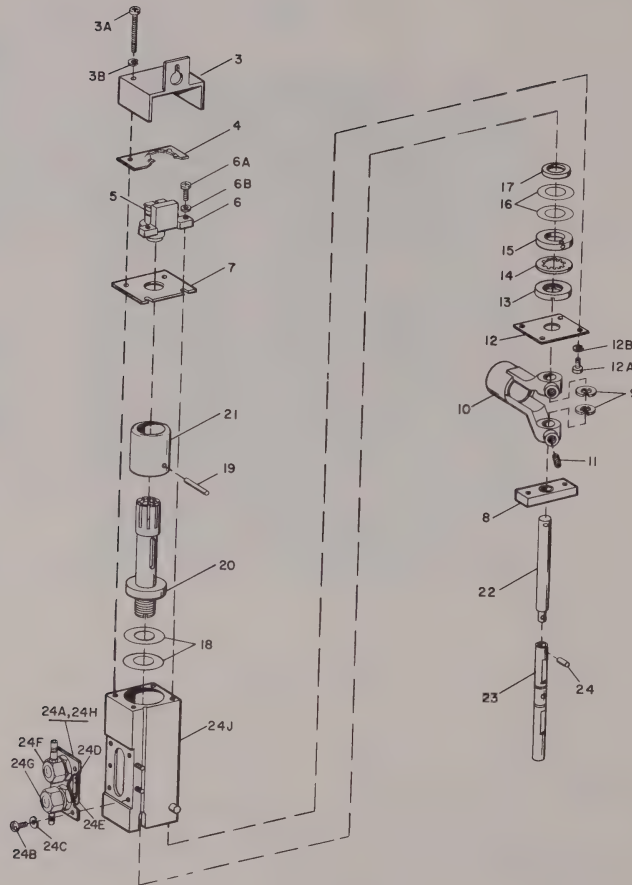
1. Remove eleven screws, and lift off front cover.
2. Remove ten screws, and lift off rear cover.

(c) Removing Capacitor Shaft Coupling.

1. Loosen two setscrews.
2. Slide coupling shaft off.



OVERHAUL MANUAL



Frequency Multiplier, Tuning Assembly
Figure 106

(d) Removing Tube. (Refer to figure 106.)

1. Remove two screws (3A).
2. Remove tube cover (3) and grid contact (4).
3. Remove two screws (6A), and raise tube socket (6) to expose end of tube.
4. Remove tube (5).



(e) Removing Tuning Slug.

1. Remove tube as directed in (d).
2. Remove two self-locking nuts and two screws securing cavity to casting.
3. Remove two screws which secure guide plate (8) to casting.
4. Remove five screws (24B), and lift off connector plate (24H).
5. Pull cavity Z1 (24J) away from casting, and be careful not to strain lead.
6. Loosen two setscrews (11), and remove C-rings (9) securing rocker arm housing to rod (22).
7. Slide off rocker arm housing (10).
8. Remove four screws (12A), and drop lower cover (12).
9. Remove nut (13), washer (14), lug (15), and washers (16).
10. Slide out rod, plate contact (20), and slug (21).
11. To separate tuning slug (21), remove tape, and press out pin (19).

(3) Intermediate Frequency Amplifier Subassembly.

- (a) To remove the intermediate frequency amplifier subassembly, disconnect connector J8. Use one wrench to hold the larger of the two nuts stationary while turning the other nut with a second wrench. Loosen the four red-headed captive screws, and pull the subunit away from the left side of the power amplifier subassembly. (Refer to figure 102.)

(b) Gaining Access to the Components.

Remove the 9 screws from the front of the subassembly and 9 screws from the rear, and lift off front and rear covers.

(c) Removing the 6.3- and 10.7-Mc Filters. (Refer to figure 107.)

1. Disconnect leads and components soldered to the terminals of the filter, using a 25-watt soldering iron. Note placement of leads and components.
2. Remove nut and washer securing the filter to the casting.
3. Remove filter.

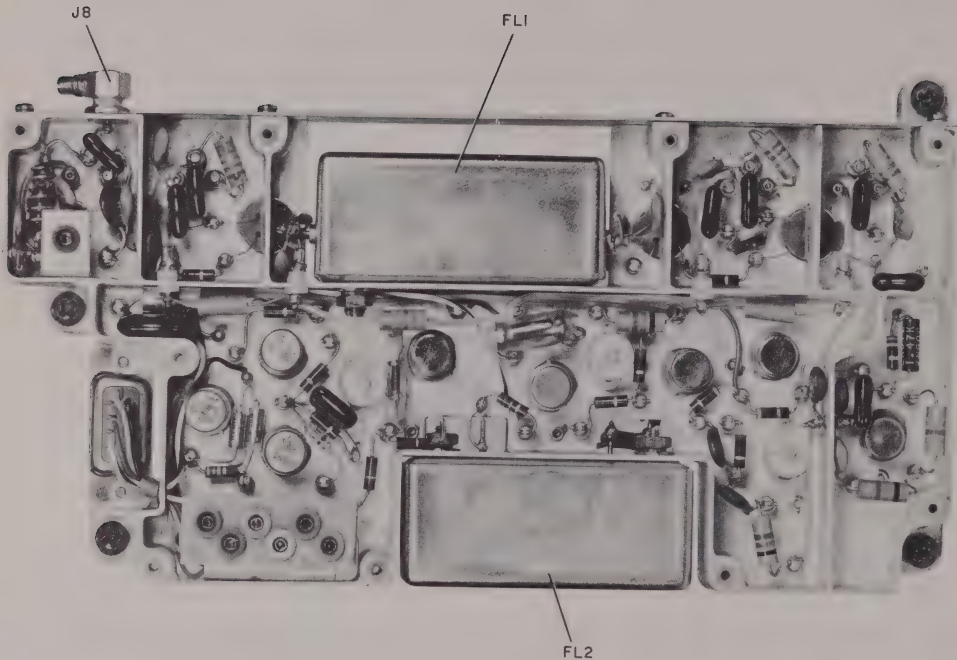
(4) Preselector Subassembly.

- (a) Removing Preselector Subassembly. (Refer to figure 102.)

1. Disconnect connector J1.



OVERHAUL MANUAL



Intermediate Frequency Amplifier, Front View
Figure 107

2. Loosen r-f lead clamp.
 3. Loosen three red-headed captive screws.
 4. Pull subunit outward from the left side of power amplifier subassembly, and be careful not to bend r-f lead.
- (b) Removing CR1. (Refer to figure 108.)
1. Loosen nut on choke housing assembly (49) using wrench to hold upper end stationary.
 2. Lift off choke housing, and pull out CR1 (51).
- (c) Removing Preselector Cam.
1. Remove E-ring from camshaft (26).



2. Raise tuning table assembly (15) to its limit, and rotate preselector cam so that it will clear the tuning table.
 3. Lift off cam and coupling assembly (25).
- (d) Removing Compression Spring.
1. Loosen setscrew (12).
 2. Raise long guide rod (11) about one-half its length.
 3. Remove spring (14) and washer (13).
- (e) Removing Movable Conductor.
1. Remove compression spring as directed in (d).
 2. Remove long guide rod (11) completely.
 3. Loosen setscrew, and remove short guide rod (21).
 4. Remove tuning table (15) from chassis (69).
 5. Remove locking spring (16).
 6. Screw out movable conductor (23 or 24) with Bristo wrench.
- (f) Removing Resistor R1.
1. Remove four screws (36), and lift off mixer housing inspection plate (34).
 2. Unsolder lower resistor lead, and remove connector J1 (57).
 3. Loosen setscrew (61).
 4. Unsolder tuning tab (53), and remove resistor (59).
- (g) Removing Fixed Conductor.
1. Remove eight screws (67), and lift off bottom cover (66).
 2. Remove nut (72) and lockwasher (73).
 3. Remove fixed conductor (70 or 71) through bottom of chassis, and be careful not to scratch interior.
- (h) Removing Bearing.
1. Raise tuning table to its limit.
 2. Remove C-ring (10).
 3. Remove bearing (9).



(5) Channel Selector Subassembly.

(a) Removing Channel Selector Subassembly. (Refer to figure 102.)

1. Loosen three red-headed captive screws, two located on top of the front gear plate and one near the blower cutout on the rear gear plate.
2. Loosen one red-headed captive screw located on the right side of the front gear plate.
3. Remove the six screws securing the T2/K1 inspection plate, and lift off plate.
4. Pull unit to the rear, and fold back on pendant cable.

(b) Removing Dust Cover. (Refer to figure 109.)

Remove 13 screws (2) securing the dust cover, and slide off the dust cover. Note that the dust cover is in two pieces.

(c) Removing Component Board.

Remove four screws (8) to gain access to components on the rear of board no. 1 (7).

(d) Removing Crystals.

1. Remove the two screws (11) securing the resistor board (10), and pull it out as far as the leads will permit.
2. Remove one screw (5).
3. Remove the four self-locking nuts (19), and slide board no. 2 off the studs to expose the crystal board. Do not strain the leads.
4. To remove crystals, unsolder the leads with a 25-watt soldering iron.

(e) Gaining Access to Successive Boards.

1. Loosen clamp with Bristo wrench, and remove switch rotor (22) where necessary.
2. Remove spacers (21) as required.
3. Slide boards off studs, and be careful not to strain any leads.

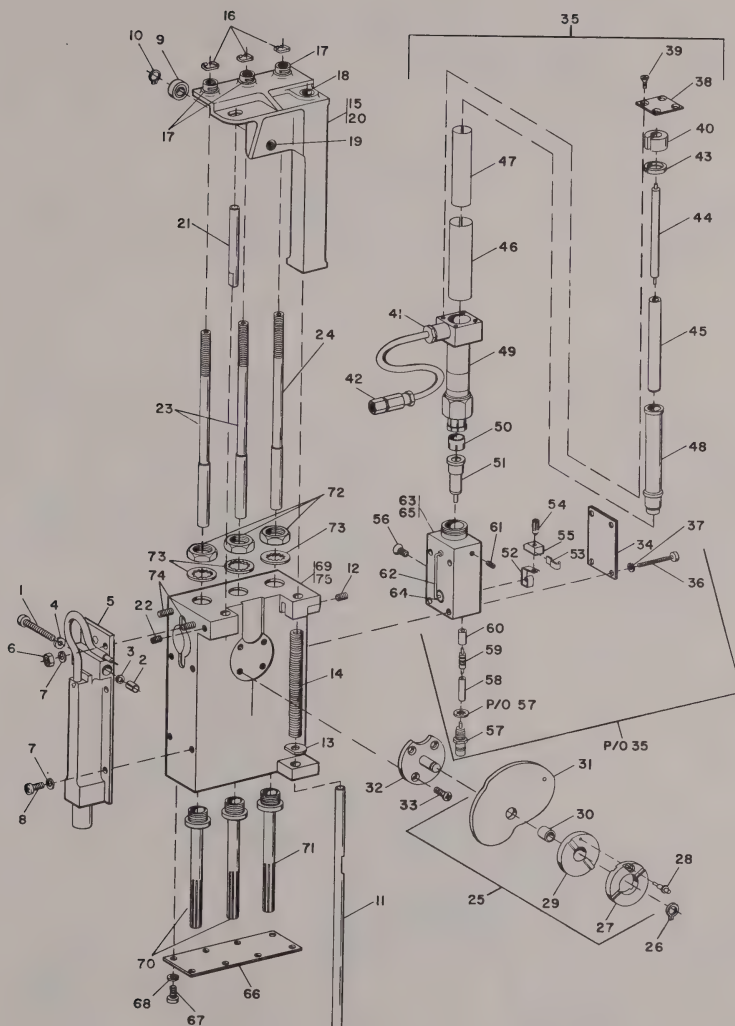
NOTE: Position of switch rotors is critical. Carefully note the orientation of any rotors which must be removed.

(f) Removing Channel Indicator Dials.

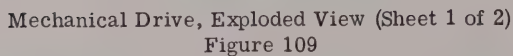
1. Remove boards, switch rotors, and spacers as necessary to expose dials.
2. Loosen setscrews (77, 79), and slide dials (76, 78) off shaft (94). Note position of dials for reassembly.



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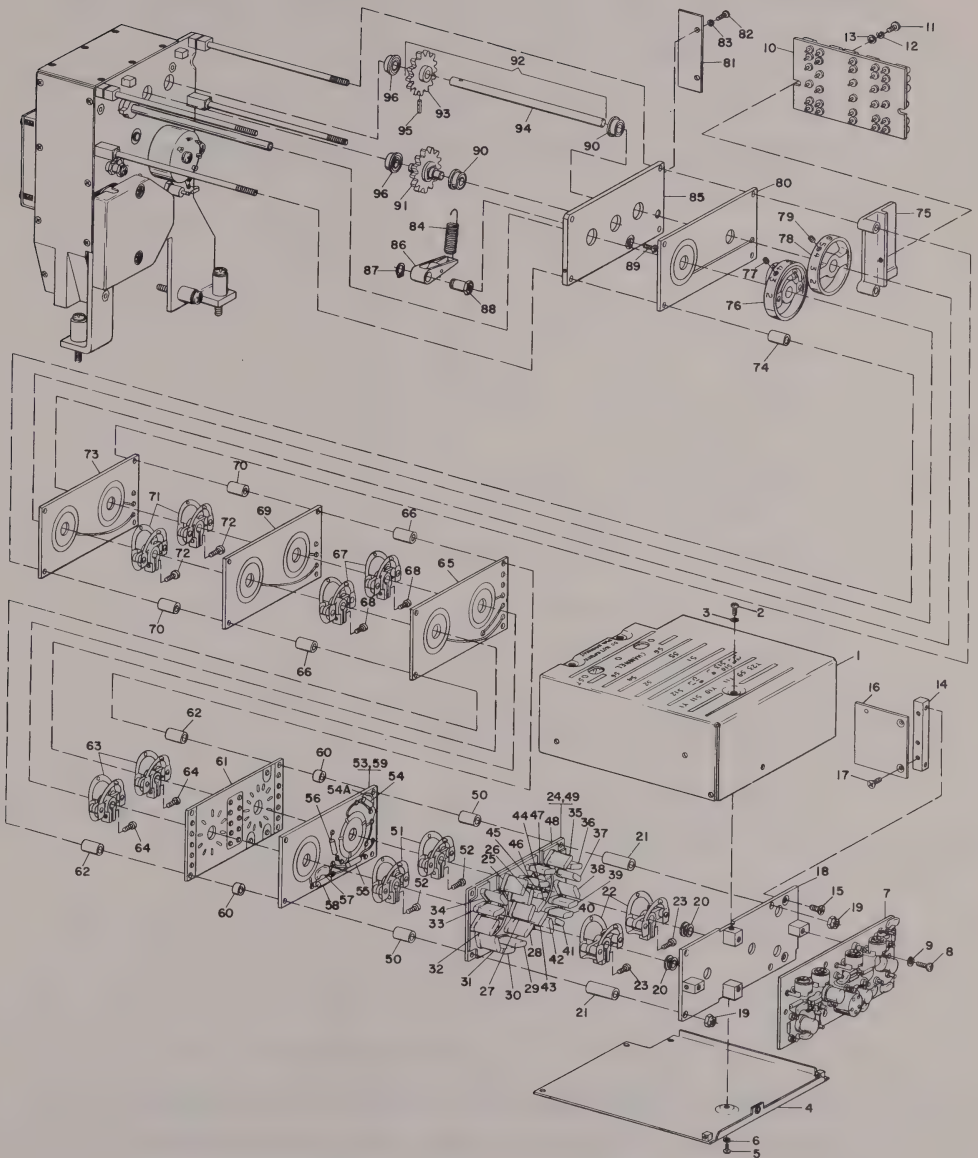


Preselector, Exploded View
Figure 108





OVERHAUL MANUAL



Mechanical Drive, Exploded View (Sheet 2 of 2)
Figure 109



(g) Removing Motor B1.

1. Unsolder leads, and note their placement.
2. Loosen screws, and remove cover (143).
3. Remove two screws (190), and lift motor (189) from gear plate.

(h) Removing Switch S8.

1. Loosen two screws (135), and lift off cover (134).
2. Unsolder leads, and note their placement.
3. Remove two screws (139) and spacers (138).
4. Remove switch wafer (137) from gear plate.

(i) Disassembling Gear Train.

1. Remove seven screws (100) and cover (99).
2. Remove four screws (104) and cover (103).
3. Remove four screws (164, 165).
4. Remove two C-rings (146, 153).
5. The gear plates can now be separated, exposing the components of the gear train, solenoid, transformer, and switch.

Specific gears can be removed by loosening setscrew collars and pressing out pins as required. Note that worm gear (229) must be removed before worm shaft (222) can be slipped out.

(6) Removing High Voltage Transformer T1.

- (a) Remove five screws located in base and end of wraparound.
- (b) Remove three screws inserted into power amplifier casting.
- (c) Pull back housing to expose high voltage transformer and other components.

(7) Gaining Access to Components on Rear of Channel Selector Subassembly Board.

- (a) Remove nine screws, and disassemble wraparound support bracket.
- (b) Remove eight screws to free the wraparound from power amplifier casting.
- (c) Pull wraparound downward, and be careful not to place any strain on the wiring harnesses.



(d) Gaining More Accessibility to Rear of Board.

1. Remove two screws securing connector P1 to wraparound.
2. Remove high voltage transformer housing as directed (6).
3. The wiring harness with the yellow, blue, and white leads can now be dressed around the front of the casting to permit the wraparound to be dropped still lower.

(8) Power Amplifier Subassembly. (Refer to figure 110.).

(a) Removing Cavity Tuning Cam.

1. Remove C-ring (68) from end of camshaft (177).
2. Slide off cam coupling assembly (67).

(b) Removing Cavity Tuning Spring.

1. Remove the four screws (34) securing the spring retainer (32) to bottom of flanged cylinder (153).
2. Remove retainer and nylon seat (35).
3. Remove spring (36).

(c) Removing Tuning Slug Follower.

1. Remove two screws (44) securing block (42) to cylinder.
2. Remove two self-locking nuts from lower end of tuning slug rods on (156).
3. Lift off follower (76, 81), and remove Teflon insert (82, 83).

NOTE: Follower cannot be completely removed from flanged cylinder unless cathode lead is unsoldered.

(d) Removing Tubes.

1. Snap out cavity cover (4, 5, 6).
2. Pull out tubes (7) with fingers.

(e) Replacing Grid Circuit Resistors.

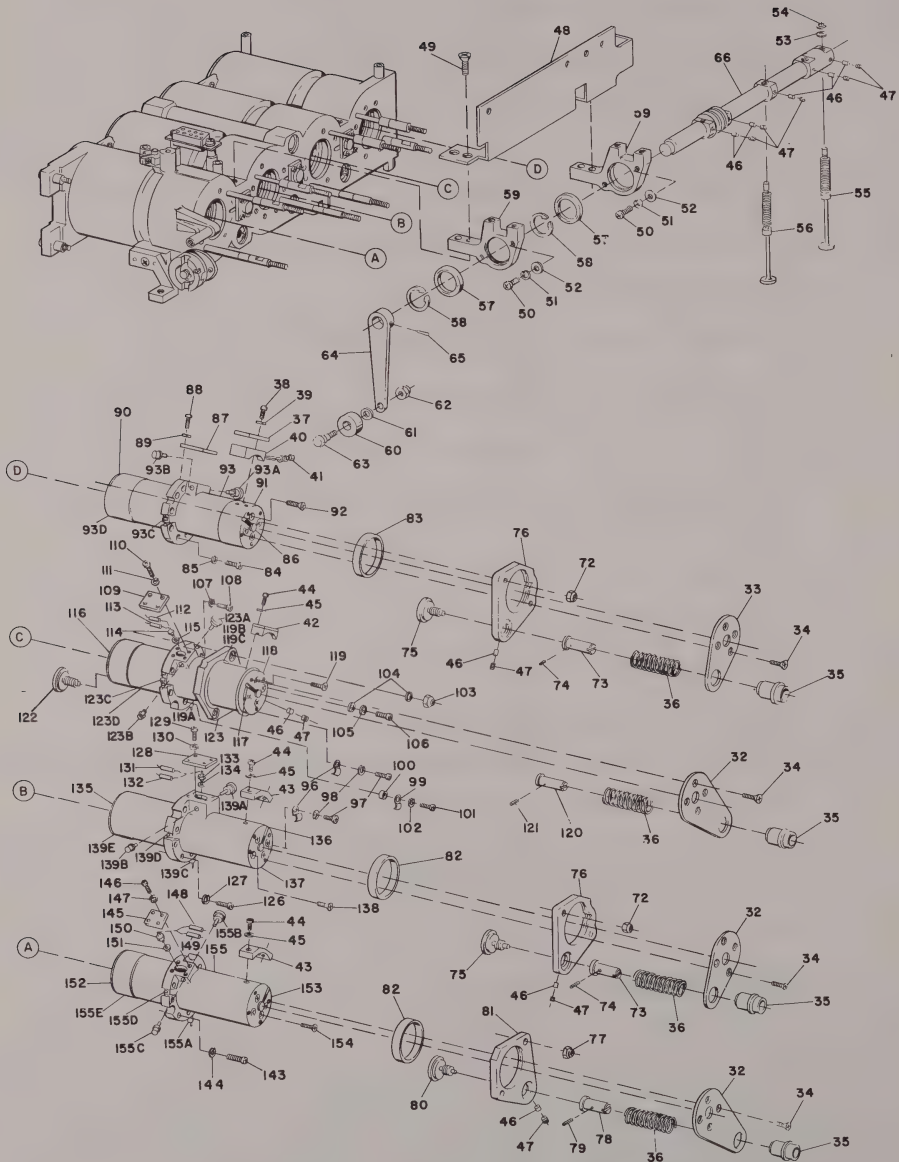
1. Remove four screws (110, 129, 146), and lift off grid plate (109, 128, 145).
2. Unsolder resistors R3 through R8, as required.

(f) Removing Tuning Slug.

1. Remove tube as directed in (d).



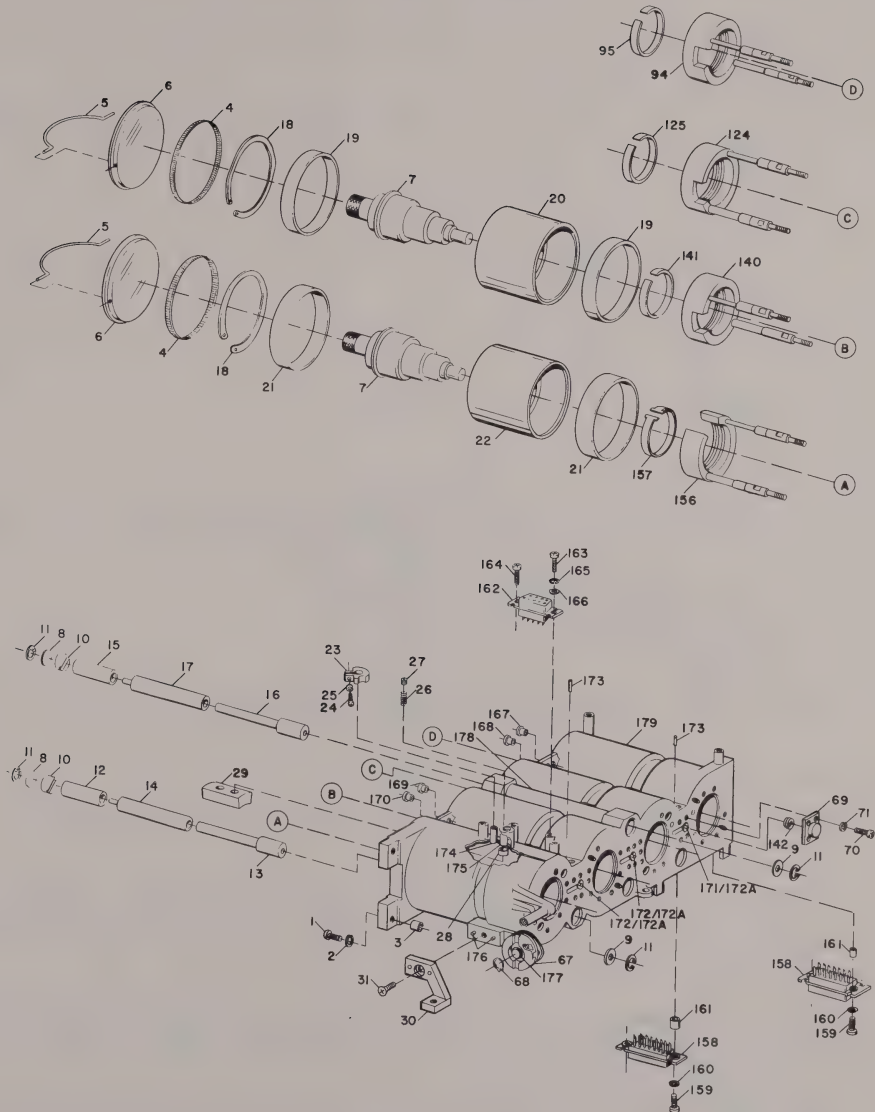
OVERHAUL MANUAL



Power Amplifier, Exploded View (Sheet 1 of 2)
Figure 110



OVERHAUL MANUAL



Power Amplifier, Exploded View (Sheet 2 of 2)
Figure 110



2. Unsolder top choke lead, and remove from slot in casting.
 3. Remove two self-locking nuts from lower end of tuning guide rods.
 4. Remove locking ring (18).
 5. Slide out upper spacer (19, 21), contact assembly (20, 22), and lower spacer (19, 21).
 6. Remove tuning slug (94, 124, 140, 156).
 7. Remove Teflon insert (157).
- (g) Removing Choke.
1. Remove C-ring (11) and upper cap (8).
 2. Remove C-ring (11) and lower cap (9).
 3. Unsolder upper plate lead.
 4. Remove short insulator (12, 15), choke (14, 17), long insulator (13, 16), and upper insulator (10) through bottom of power amplifier casting.
 5. Slide long insulator off upper plate lead.
 6. Unsolder leads from choke (14, 17).

NOTE: Components within the flanged cylinder (91, 118, 137, 155) are classed as a critical assembly. Do Not attempt repair in the field.

D. Distance Mechanism Module. (Refer to figure 111.)

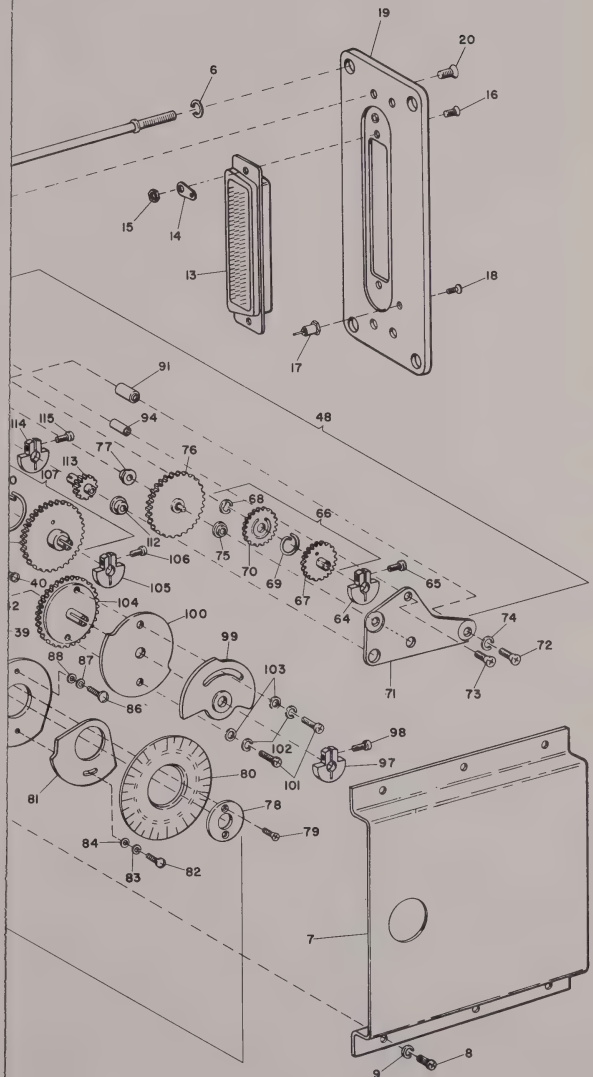
- (1) Remove the distance mechanism from the chassis as directed in paragraph 2.B(1) of this section.
- (2) Remove four retaining rings (5) and the four long captive screws (4). Remove two screws (2) and lock washers (3), and lift off top cover (1). Remove twelve screws (8 and 14) and twelve washers (9 and 12) from two side dust covers (7 and 10); then remove two side dust covers (7 and 10).

NOTE: If a potentiometer, resolver, or synchro is to be replaced, lock both the top and the vertical gear trains. With reasonable care, only the replacement part will require alignment.

- (3) Remove top retaining plate (21) by removing two screws (22) and two lock washers (23).
- (4) Remove units indicator dial (25) by removing two screws (26).
- (5) Remove the following gears in the order listed: transfer pinion (30), units gear assembly (34), and tens gear (29).



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Distance Mechanism Module, Exploded View
Figure 111



2. Unsolder top choke lead, and remove from slot in casting.
 3. Remove two self-locking nuts from lower end of tuning guide rods.
 4. Remove locking ring (18).
 5. Slide out upper spacer (19, 21), contact assembly (20, 22), and lower spacer (19, 21).
 6. Remove tuning slug (94, 124, 140, 156).
 7. Remove Teflon insert (157).
- (g) Removing Choke.
1. Remove C-ring (11) and upper cap (8).
 2. Remove C-ring (11) and lower cap (9).
 3. Unsolder upper plate lead.
 4. Remove short insulator (12, 15), choke (14, 17), long insulator (13, 16), and upper insulator (10) through bottom of power amplifier casting.
 5. Slide long insulator off upper plate lead.
 6. Unsolder leads from choke (14, 17).

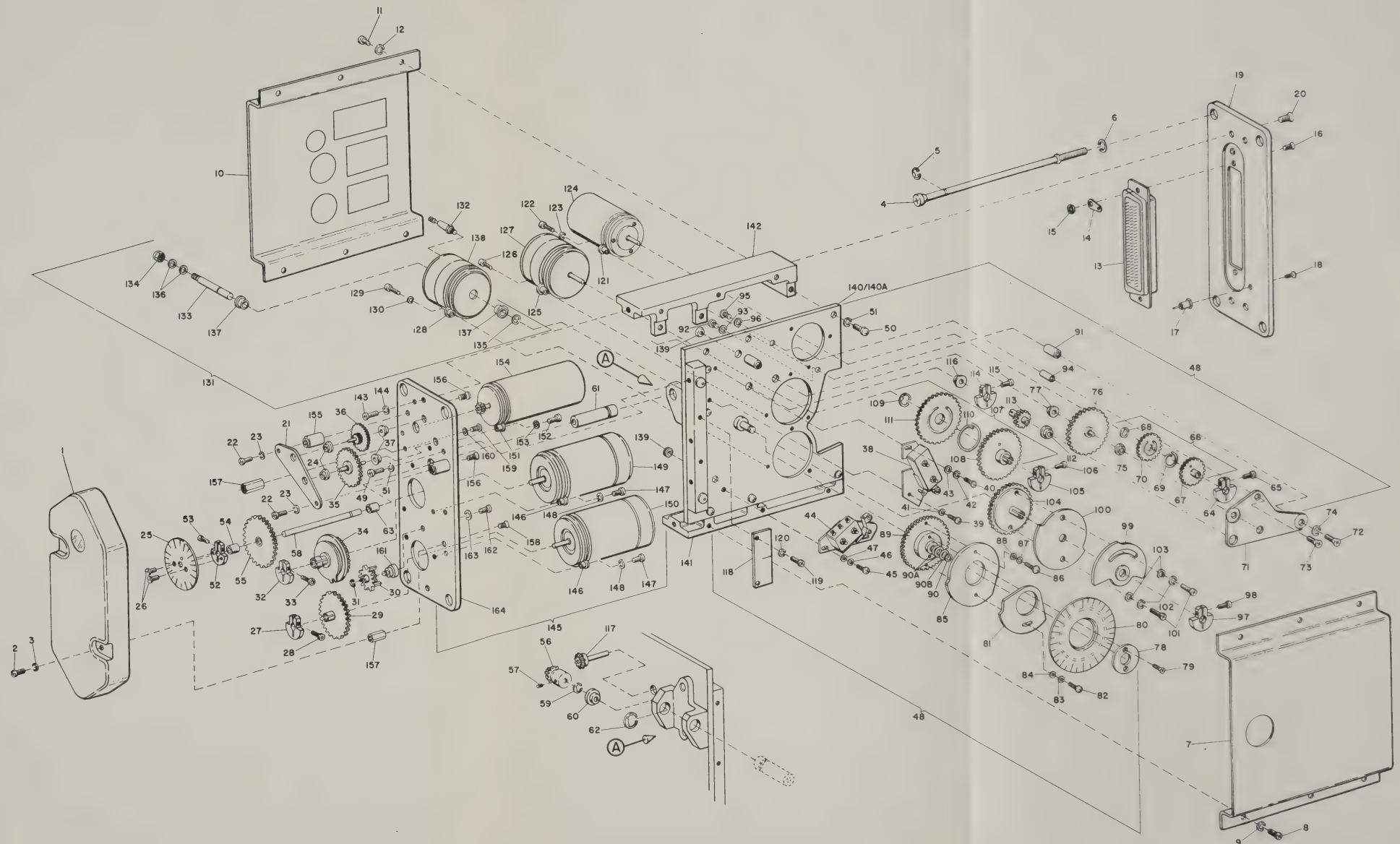
NOTE: Components within the flanged cylinder (91, 118, 137, 155) are classed as a critical assembly. Do Not attempt repair in the field.

D. Distance Mechanism Module. (Refer to figure 111.)

- (1) Remove the distance mechanism from the chassis as directed in paragraph 2.B(1) of this section.
- (2) Remove four retaining rings (5) and the four long captive screws (4). Remove two screws (2) and lock washers (3), and lift off top cover (1). Remove twelve screws (8 and 14) and twelve washers (9 and 12) from two side dust covers (7 and 10); then remove two side dust covers (7 and 10).

NOTE: If a potentiometer, resolver, or synchro is to be replaced, lock both the top and the vertical gear trains. With reasonable care, only the replacement part will require alignment.

- (3) Remove top retaining plate (21) by removing two screws (22) and two lock washers (23).
- (4) Remove units indicator dial (25) by removing two screws (26).
- (5) Remove the following gears in the order listed: transfer pinion (30), units gear assembly (34), and tens gear (29).



Distance Mechanism Module, Exploded View
Figure 111

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- (6) Remove hundreds dial (80) by removing two screws (79). Remove retaining ring (90) and hundreds dial gear (89).
- (7) Remove hundreds switch S1 (38) and remote switch S2 (44) from gear plate (140).
- (8) Remove front retaining plate (71) by removing three screws (72, 73).
- (9) Remove collar (105) holding range potentiometer gear to range potentiometer R1 (127).
- (10) Loosen collar (97) holding range potentiometer cam (99) and cam gear (104) to range potentiometer R2 (139).
- (11) Remove interstage gear (76) from gear plate (140).
- (12) Loosen collar (64), and slip resolver gear assembly (66) from resolver (124) shaft.
- (13) Remove range potentiometer gear assembly (107) from gear plate (140).
- (14) Remove collar (52) from units indicator idler gear (55).
- (15) Remove second stage gear (35), first stage gear (35), and units indicator idler gear (55).
- (16) Remove fifteen screws (20, 49, 50, 143) and eleven lock washers (51, 144); fold away bottom plate (19) with connector P1 (13) from remainder of components.
- (17) Pull top gear plate (164) from front gear plate (140).
- (18) This allows access to two synchro control transmitters (149, 150), motor-rate generator (154), and the bevel transfer pinions (56, 117). Disassemble further as required for the repair or replacement of parts.

NOTE: Do not remove bevel gear (56) from its respective shaft (58) unless absolutely necessary. Disassemble motor-rate generator (154) only if repairs are necessary.



860E-2 Distance Measuring Equipment - Cleaning

1. GENERAL.

This section contains instructions and procedures for cleaning the disassembled components of 860E-2 Distance Measuring Equipment.

2. CLEANING MATERIALS AND AGENTS.

Figure 201 lists the materials and agents required to clean the disassembled components of the 860E-2. Solvent is a mixture by volume of methylene chloride 25 percent, perchloroethylene 5 percent, and dry-cleaning solvent 70 percent.

MATERIALS	SPECIFICATION
Solvent, a mixture of (by volume)	
Methylene chloride 25 percent	AN-M-37
Perchloroethylene 5 percent	Fed Spec O-T-226
Dry-cleaning solvent 70 percent	Fed Spec P-S-661a
Solvent, alcohol	MIL-A-6091A(ASG)
Chamois skin	
Cloth, cotton, lintless	
Detergent, powder	
Oil, lubricating	MIL-L-6085A
Paper, lens tissue	
Paper, tissue, fine grade	

Table of Cleaning Materials and Protective Agents
Figure 201



WARNING: PERFORM OPERATIONS INVOLVING CLEANING SOLVENT UNDER A VENTILATED HOOD. AVOID BREATHING SOLVENT VAPOR; WEAR A SUITABLE MASK WHEN NECESSARY. USE GOGGLES, GLOVES, AND APRON TO PREVENT IRRITATION DUE TO PROLONGED CONTACT.

References to air jet signify a hand-operated air nozzle supplied with clean, dry, compressed air at a pressure of 25 to 38 psi maximum.

WARNING: WEAR GOGGLES WHEN USING AIR JET TO BLOW DUST AND DIRT FROM PARTS. WARN PERSONS IN THE IMMEDIATE VICINITY.

NOTE: An ultrasonic cleaner, such as Alcore Instrument Company Model 3100 Ultrasonic Cleaner, can be used to clean the metal gears and other small metal parts. Refer to the instructions supplied with the ultrasonic cleaner for exact uses and procedures. Use the drying methods and lubrication normally used in cleaning a part.

3. CLEANING PROCEDURES.

A. Bearing Plates and Mechanical Assemblies.

CAUTION: DO NOT SOAK BEARING PLATES AND ASSEMBLIES CONTAINING OILITE BEARINGS IN CLEANING SOLVENT. IF NECESSARY TO IMMERSE THESE ITEMS WHILE CLEANING, DRY IMMEDIATELY TO PREVENT LOSS OF OIL.

- (1) Wash the assembly with solvent using a soft-bristled, nonmetallic brush to dislodge dirt. Do not immerse in solvent. Avoid damage to the silk-screened information.
- (2) Wipe dry with a soft cloth.
- (3) Lubricate Oilite bearings with one or two drops of MIL-L-6085 A oil.
- (4) Cleaning of ball bearings is not recommended. Replace ball bearings as required with new prelubricated ball bearings.

B. Chassis, Module Assemblies, and Circuit Boards.

Using the following procedure to clean wired chassis, modules, and circuit boards.

- (1) Remove dust, dirt, and foreign matter from all surfaces, including parts and wiring, using soft-bristled brushes in conjunction with an air jet. Avoid air-blasting small coils, leads, and other delicate parts by too close an approach with air jet nozzle. Exercise caution in use of brushes on delicate parts.

NOTE: When necessary to disturb the dress of wiring and cables, always restore wiring and cables to their proper positions or dress after cleaning.

- (2) Wipe finished surfaces using cloth moistened with solvent; then dry these surfaces immediately with clean cloth. Exercise care in wiping solvent from resistors, as color coding may be removed.



860E-2 Distance Measuring Equipment - Cleaning

1. GENERAL.

This section contains instructions and procedures for cleaning the disassembled components of 860E-2 Distance Measuring Equipment.

2. CLEANING MATERIALS AND AGENTS.

Figure 201 lists the materials and agents required to clean the disassembled components of the 860E-2. Reference to the word solvent shall be understood to be a mixture by volume of methylene chloride 25 percent, perchloroethylene 5 percent, and dry-cleaning solvent 70 percent.

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Solvent, a mixture of (by volume)	
Methylene chloride 25 percent	AN-M-37
Perchloroethylene 5 percent	Fed Spec O-T-226
Dry-cleaning solvent 70 percent	Fed Spec P-S-661a
Solvent, alcohol	MIL-A-6091A (ASG)
Chamois skin	
Cloth, cotton, lintless	
Detergent, powder	
Oil, lubricating	MIL-L-6085A
Paper, lens tissue	
Paper, tissue, fine grade	

Table of Cleaning Materials and Protective Agents
Figure 201



OVERHAUL MANUAL

WARNING: PERFORM OPERATIONS INVOLVING CLEANING SOLVENT UNDER A VENTILATED HOOD. AVOID BREATHING SOLVENT VAPOR; WEAR A SUITABLE MASK WHEN NECESSARY. USE GOGGLES, GLOVES, AND APRON TO PREVENT IRRITATION DUE TO PROLONGED CONTACT. CHANGE CLOTHING THAT HAS BECOME SATURATED WITH SOLVENT.

References to air jet signify a hand-operated air nozzle supplied with clean, dry, compressed air at a pressure of 25 to 38 psi maximum.

WARNING: WEAR GOGGLES WHEN USING AIR JET TO BLOW DUST AND DIRT FROM PARTS. WARN PERSONS IN THE IMMEDIATE VICINITY.

NOTE: An ultrasonic cleaner, such as Alcore Instrument Company Model 3100 Ultrasonic Cleaner, can be used to clean the metal gears and other small metal parts. Refer to the instructions supplied with the ultrasonic cleaner for exact uses and procedures. Use the drying methods and lubrication normally used in cleaning a part.

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CAUTION: DO NOT SOAK BEARING PLATES AND ASSEMBLIES CONTAINING OILITE BEARINGS IN CLEANING SOLVENT. IF NECESSARY TO IMMERSE THESE ITEMS WHILE CLEANING, DRY IMMEDIATELY TO PREVENT LOSS OF IMPREGNATED OIL.

- (1) Wash the assembly with solvent using a soft-bristled, nonmetallic brush to dislodge dirt. Do not immerse in solvent. Avoid damage to the silk-screened information.
- (2) Wipe dry with a soft cloth.
- (3) Lubricate Oilite bearings with one or two drops of MIL-L-6085A oil.
- (4) Cleaning of ball bearings is not recommended. Replace ball bearings as required with new prelubricated ball bearings.

B. Chassis, Module Assemblies, and Circuit Boards.

Using the following procedure to clean wired chassis, modules, and circuit boards.

- (1) Remove dust, dirt, and foreign matter from all surfaces, including parts and wiring, using soft-bristled brushes in conjunction with an air jet. Avoid air-blasting small coils, leads, and other delicate parts by too close an approach with air jet nozzle. Exercise caution in use of brushes on delicate parts.

NOTE: When necessary to disturb the dress of wiring and cables, always restore wiring and cables to their proper positions or dress after cleaning.

- (2) Wipe finished surfaces using cloth moistened with solvent; then dry these surfaces immediately with clean cloth. Exercise care in wiping solvent from resistors, as color coding may be removed.



CAUTION: THE MOISTURE SEALANT ON THE EPOXY WIRING BOARDS WILL SOFTEN IF SOLVENT IS APPLIED FOR LONG PERIODS OF TIME OR IF AN EXCESSIVE AMOUNT OF SOLVENT IS USED.

- (3) Make touch-up repairs of minor damage to finish of any silk-screened information. Protect from dust, moisture, and physical damage.

C. Connectors.

- (1) Wipe dust and dirt from bodies, shells, and cable clamps using cloth moistened with alcohol; wipe dry with clean cloth.
- (2) Remove dust from insert using small, soft-bristled brush in conjunction with air jet.
- (3) Wash dirt and any traces of lubricant from insert, insulation, and contacts using solvent applied sparingly with small, soft brush.
- (4) Dry the insert with air jet.

D. Covers and Shields.

Clean sheet-metal covers and shields, such as dust covers, chassis covers, and housing as follows:

- (1) Remove bulk of surface grease and dirt with rags.
- (2) Blow dust from surfaces, holes, and recesses with air jet.
- (3) Immerse cover or shield in washing bath of solvent, and scrub until clean; work solvent over all surfaces and into holes and recesses with suitable nonmetallic brush.
- (4) Remove from bath and permit solvent to drain.
- (5) Immerse in rinsing bath of cleaning solvent; rinse, and remove from bath. Do not permit solvent to remain trapped in holes or recesses during draining. When positioning will not permit complete draining, use air jet to remove any trapped solvent.
- (6) When thoroughly dry, touch up minor damage to finish including silk-screened information. Extensive damage to finish may require complete refinishing. Protect covers and shields from dust and moisture.

E. Metal Gears.

Clean gears and gear assemblies according to procedure for cleaning machined metal parts, paragraph G.

NOTE: Split-gear assemblies require cleaning between the two gears. Accomplish this while washing by moving gears with fingers. Dry by use of radiant heat. Lubricate between adjacent surfaces after drying with one or two drops of a MIL-L-6085A oil.



F. Jacks.

- (1) Remove dust with soft brush and air jet.
- (2) Wash dirt and any traces of lubricant from contacts and insulation with alcohol applied sparingly with small camel-hair brush. Do not allow solvent to run into sleeves or conduit covering wires connected to contact terminals of the jack.
- (3) Dry the jack with an air jet.

G. Machined Metal Parts or Assemblies.

Cams, gears, shafts, pins, collars, springs, and similar machined parts or assemblies of such items should be cleaned as follows:

CAUTION: DO NOT SOAK ASSEMBLIES CONTAINING OILITE BEARINGS IN CLEANING SOLVENT. IF NECESSARY TO IMMERSE WHILE CLEANING, DRY IMMEDIATELY TO PREVENT LOSS OF IMPREGNATED OIL.

- (1) Remove bulk of surface grease with rags.
- (2) Immerse part in washing bath of solvent, and scrub until clean with suitable nonmetallic brushes. Remove from bath and drain. Repeat washing process in clean solvent if necessary.
- (3) Dry in dust-free, dry areas or suitable enclosures. Wherever atmospheric humidity is high, the use of radiant heat in a ventilated enclosure is recommended.
- (4) When dry, immediately apply light coat of MIL-L-6085A oil to any bare metal surfaces subject to corrosion.

CAUTION: DO NOT SOAK OR OIL CLUTCH DISCS. WIPE CLUTCH DISC SURFACES WITH CLEAN, DRY, LINTLESS CLOTH. AT ALL TIMES, KEEP CLUTCH SURFACES FREE OF ALL CONTAMINANTS, SUCH AS OIL, DIRT, FINGERPRINTS, ETC.

H. Miscellaneous Metal Parts.

Metal parts, such as mounting plates, mounting clamps, brackets, blower fan, handles, fasteners, and hardware should be cleaned in a suitable cleaning machine or washed in solvent to remove all accumulated dirt and dust.

I. Switches, Rotary.

Clean all rotary switches as follows:

- (1) Carefully remove dust with air jet, gently turning switch rotor while applying air.
- (2) Fill three containers with alcohol.



CAUTION: THE MOISTURE SEALANT ON THE EPOXY WIRING BOARDS IS SUSCEPTIBLE TO SOFTENING IF SOLVENT IS APPLIED FOR LONG PERIODS OF TIME OR IF AN EXCESSIVE AMOUNT OF SOLVENT IS USED.

- (3) Make touch-up repairs of minor damage to finish of any silk-screened information. Protect from dust, moisture, and physical damage.

C. Connectors.

- (1) Wipe dust and dirt from bodies, shells, and cable clamps using cloth moistened with alcohol; wipe dry with clean cloth.
- (2) Remove dust from insert using small, soft-bristled brush in conjunction with air jet.
- (3) Wash dirt and any traces of lubricant from insert, insulation, and contacts using solvent applied sparingly with small, soft brush.
- (4) Dry the insert with air jet.

D. Covers and Shields.

Clean sheet-metal covers and shields, such as dust covers, chassis covers, and housing as follows:

- (1) Remove bulk of surface grease and dirt with rags.
- (2) Blow dust from surfaces, holes, and recesses with air jet.
- (3) Immerse cover or shield in washing bath of solvent, and scrub until clean; work solvent over all surfaces and into holes and recesses with suitable nonmetallic brush.
- (4) Remove from bath and permit solvent to drain.
- (5) Immerse in rinsing bath of cleaning solvent; rinse, and remove from bath. Do not permit solvent to remain trapped in holes or recesses during draining. When positioning will not permit complete draining, use air jet to remove any trapped solvent.
- (6) When thoroughly dry, touch up minor damage to finish including silk-screened information. Extensive damage to finish may require complete refinishing. Protect covers and shields from dust and moisture.

E. Metal Gears.

Clean gears and gear assemblies according to procedure for cleaning machined metal parts, paragraph G.

NOTE: Split-gear assemblies require cleaning between the two gears. Accomplish this while washing by moving gears with fingers. Dry by use of radiant heat. Lubricate between adjacent surfaces after drying with one or two drops of a MIL-L-6085A oil.



F. Jacks.

- (1) Remove dust with soft brush and air jet.
- (2) Wash dirt and any traces of lubricant from contacts and insulation with alcohol applied sparingly with small camel-hair brush. Do not allow solvent to run into sleeves or conduit covering wires connected to contact terminals of the jack.
- (3) Dry the jack with an air jet.

G. Machined Metal Parts or Assemblies.

Cams, gears, shafts, pins, collars, springs, and similar machined parts or assemblies of such items should be cleaned as follows:

CAUTION: DO NOT SOAK ASSEMBLIES CONTAINING OILITE BEARINGS IN CLEANING SOLVENT. IF NECESSARY TO IMMERSE WHILE CLEANING, DRY IMMEDIATELY TO PREVENT LOSS OF IMPREGNATED OIL.

- (1) Remove bulk of surface grease with rags.
- (2) Immerse part in washing bath of solvent, and scrub until clean with suitable nonmetallic brushes. Remove from bath and drain. Repeat washing process in clean solvent if necessary.
- (3) Dry in dust-free, dry areas or suitable enclosures. Wherever atmospheric humidity is high, the use of radiant heat in a ventilated enclosure is recommended.
- (4) When dry, immediately apply light coat of MIL-L-6085A oil to any bare metal surfaces subject to corrosion.

CAUTION: DO NOT SOAK OR OIL CLUTCH DISCS. WIPE CLUTCH DISC SURFACES WITH CLEAN, DRY, LINTLESS CLOTH. AT ALL TIMES, KEEP CLUTCH SURFACES FREE OF ALL FOREIGN CONTAMINANTS, SUCH AS OIL, DIRT, FINGERPRINTS, ETC.

H. Miscellaneous Metal Parts.

Metal parts, such as mounting plates, mounting clamps, brackets, blower fan, handles, fasteners, and hardware should be cleaned in a suitable cleaning machine or washed in solvent to remove all accumulated dirt and dust.

I. Switches, Rotary.

Clean all rotary switches as follows:

- (1) Carefully remove dust with air jet, gently turning switch rotor while applying air.
- (2) Fill three containers with alcohol.



- (3) Carefully wash only movable and stationary contacts with alcohol from first container. Apply alcohol to contacts with small, soft-bristled brush.
- (4) Proceed in sequence to the second and third containers, and rewash the switch contacts as explained in step (3). If the sequence is carried out in this manner, each switch will be washed three times independently.
- (5) Dry carefully with air jet, taking care that alcohol is not blown into components mounted on switch.

NOTE: One quart of clean alcohol will clean 160 switch sections before replacement is required.

J. Nonmetallic Parts.

- (1) Remove all surface dust and dirt using soft-bristled brush in connection with air jet.
- (2) Using a clean lintless cloth lightly moistened with solvent, clean composition parts by wiping clean.

CAUTION: SOLVENT SHOULD NOT BE USED TO CLEAN NYLON, EPOXY, OR TEFLON PARTS BECAUSE SWELLING RESULTS. CLEAN THESE PARTS USING A WASHING BATH OF 2 OUNCES OF DETERGENT POWDER TO A GALLON OF WATER, AND USE SUITABLE BRUSHES TO REMOVE SURFACE DIRT OR FOREIGN MATTER.

K. Relays.

- (1) Clean dirty (not pitted or burned) contacts with a burnishing tool. Before using tool, clean its burnishing surface with clean alcohol MIL-A-6091A(ASG). Do not allow fingers to touch this surface after cleaning or prior to use.

CAUTION: CONTACT SUPPORTING MEMBERS SHOULD NOT BE BENT OR FORCED BEYOND THEIR NORMAL OPERATING LIMITS WHILE BURNISHING CONTACTS.

- (2) Remove dust and dirt by careful use of air jet and soft-bristled brush. Direct air jet on contacts, operating the relay armature with fingers while blowing, so that dust will be blown from contact surfaces as they open and close.
- (3) Wash all surfaces of all contacts with alcohol MIL-A-6091A(ASG).
- (4) Dry contacts with air jet; then remove any residue by passing small strips of clean, white writing paper back and forth between each pair of contacts while holding them with light finger pressure in their closed position.



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- (3) Carefully wash only movable and stationary contacts with alcohol from first container. Apply alcohol to contacts with small, soft-bristled brush.
- (4) Proceed in sequence to the second and third containers, and rewash the switch contacts as explained in step (3). If the sequence is carried out in this manner, each switch will be washed three times independently.
- (5) Dry carefully with air jet, taking care that alcohol is not blown into components mounted on switch.

NOTE: One quart of clean alcohol will clean 160 switch sections before replacement is required.

J. Nonmetallic Parts.

- (1) Remove all surface dust and dirt using soft-bristled brush in connection with air jet.
- (2) Using a clean lintless cloth lightly moistened with solvent, clean composition parts by wiping clean.

CAUTION: SOLVENT SHOULD NOT BE USED TO CLEAN NYLON, EPOXY, OR TEFLON PARTS BECAUSE SWELLING RESULTS. CLEAN THESE PARTS USING A WASHING BATH OF TWO OUNCES OF DETERGENT POWDER TO A GALLON OF WATER AND USING SUITABLE BRUSHES TO REMOVE SURFACE DIRT OR FOREIGN MATTER.

K. Relays.

- (1) Clean dirty (not pitted or burned) contacts using burnishing tool. Before using tool, clean its burnishing surface with clean alcohol MIL-A-6091A(ASG). Do not allow fingers to touch this surface after cleaning or prior to use.

CAUTION: CONTACT SUPPORTING MEMBERS SHOULD NOT BE BENT OR FORCED BEYOND THEIR NORMAL OPERATING LIMITS WHILE BURNISHING CONTACTS.

- (2) Remove dust and dirt by careful use of air jet and soft-bristled brush. Direct air jet on contacts, operating the relay armature with fingers while blowing, so that dust will be blown from contact surfaces as they open and close.
- (3) Wash all surfaces of all contacts with alcohol MIL-A-6091A(ASG).
- (4) Dry contacts with air jet; then remove any residue by passing small strips of clean, white writing paper back and forth between each pair of contacts while holding them with light finger pressure in their closed position.



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860E-2 Distance Measuring Equipment - Inspection/Check

1. GENERAL.

This section contains instructions to assist in determining, by inspection, the condition of disassembled and cleaned assemblies of 860E-2 Distance Measuring Equipment. Defects resulting from wear, physical damage, deterioration, or other causes are found by these inspection procedures. To aid inspection, detailed inspection procedures are arranged alphabetically.

2. INSPECTION PROCEDURES.

Figure 301 lists mechanical and electrical parts to be inspected and contains references to applicable paragraphs containing inspection procedures.

A. Bearings, Ball.

The condition of ball bearings is determined best by employing starting torque and axial vibration tests.

Starting torque testers, such as the 13716-1-A available from Eclipse-Pioneer or equivalent, and the SmoothRator available from the Barden Corporation or equivalent, are examples of the type of instruments that can be used in testing ball bearings.

ITEM	REFER TO PARAGRAPH	ITEM	REFER TO PARAGRAPH
Bearings, ball	2.A	Mechanical metal parts	2.M
Bearings, bronze	2.B	Molded plastic parts	2.N
Chassis	2.C	Printed circuit switch boards	2.O
Connectors	2.D	R-f coils	2.P
Capacitors, fixed	2.E	Relays	2.Q
Capacitors, variable	2.F	Resistor, fixed composition	2.R
Covers and shields	2.G	Resistors, fixed wire-wound	2.S
Gears, metal and plastic	2.H	Trim potentiometers	2.T
Gear trains	2.I	Switches, rotary	2.U
Insulators: ceramic, Mycalex, or plastic	2.J	Terminal connection, soldered	2.V
Jacks	2.K	Transformer and reactors	2.W
Machined metal parts	2.L	Wiring	2.X

Index of Inspection Procedures
Figure 301



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B. Bearings, Bronze.

Inspect all bearings for pitted, scarred, or scuffed load-bearing surfaces. Check for burns, corrosion, and any other abnormal conditions occurring on load-bearing surfaces.

C. Chassis.

Inspect chassis for deformation, dents, punctures, badly worn surfaces, damaged connectors, damaged fastener devices, or damaged handles. Also examine them for corrosion and damage to finish that requires work in the finishing department.

D. Connectors.

Inspect connector bodies for broken parts, deformed shells or clamps, and other irregularities. Inspect for cracked or broken insulation and for contacts that are broken, deformed, or out of alignment. Also check for corroded or damaged plating on contacts and for loose, poorly soldered, broken, or corroded terminal connections.

E. Capacitors, Fixed.

Inspect fixed capacitors for defects listed in figure 302.

DEFECT	METAL CASE	MOLDED TYPE	CERAMIC TYPE
Cracked, broken, or charred terminal insulation	X		
Case damage (dents or holes)	X		
Case damage (cracks or breakage)		X	
Body damage (cracks or breakage)			X
Loose, broken, or corroded terminal studs, lugs, or leads	X	X	X
Loose, broken, or poorly soldered connections	X	X	X

Inspection of Fixed Capacitors
Figure 302

F. Capacitors, Variable.

(1) Air.

Inspect air variable capacitors for bent and shorted plates and misaligned shafts.

(2) Ceramic.

Inspect ceramic trimmers for chipped and cracked bodies, damaged dielectrics, and damaged contacts.



G. Covers and Shields.

Inspect covers and shields for punctures, deep dents, and badly worn surfaces. Also check for damaged fastener devices, corrosions, and damage to finish that requires work in finishing department.

H. Gears: Metal and Plastic.

- (1) Inspect gears for broken, chipped, or badly worn teeth.
- (2) Inspect gears for cracks and deformation.
- (3) Inspect surfaces for corrosion or other abnormal conditions.

I. Gear Trains.

Rotate the gear trains manually. They should turn freely and smoothly without binding, sticking, or excessive backlash.

J. Insulators: Ceramic, Mycalex, or Plastic.

Inspect all ceramic, Mycalex, or plastic insulators for evidence of damage, such as broken or chipped edges, burned areas, or presence of foreign matter.

K. Jacks.

Inspect all jacks for corrosion, rust, loose or broken parts, cracked insulation, bad contacts, and other irregularities.

L. Machined Metal Parts.

- (1) Make over-all checks for physical damage to surfaces, corners, and edges.
- (2) Inspect closely all machined surfaces, holes, bores, counterbores, slots, grooves, shoulder flanges, teeth, tapped holes, and all threaded members, both male and female, for physical damage of any sort including roughness of surface, corrosion, or presence of foreign matter.
- (3) Inspect plated or finished areas for damage requiring replating or refinishing beyond touch-up repair.

M. Mechanical Metal Parts.

Inspect the unmachined mechanical metal parts, including ventilating grilles, mounting plates, chassis, mounting clamps and bracket, nuts, bolts, screws, washers, handles, fasteners, and hardware, for physical damage or deformation. Also check for corrosion and any damage which would require replating or refinishing beyond practical touch-up.

N. Molded Plastic Parts.

Inspect plastic parts, such as terminal boards, mounting blocks, and insulating members, for signs of corrosion, cracked or charred insulation, and loose or missing mounting hardware. Also check for other abnormal indications which might be a source of future breakdown.



O. Printed Circuit Switch Boards.

- (1) Inspect for loose, broken, corroded, or poorly soldered terminal connections.
- (2) Inspect printed circuits for any evidence of damage, such as burned, broken, cracked, or corroded plating.
- (3) Inspect for loose mounting of printed circuit switch boards.

P. R-F Coils.

Inspect r-f coils for broken leads, loose mountings, and loose, poorly soldered, or broken terminal connections. Also check for crushed, scratched, cut, bruised, or charred windings; corrosion on windings, leads, terminals, and connections; and for physical damage to forms and tuning slug adjustment screws.

Q. Relays.

- (1) Inspect relay contacts for burned or pitted areas, welds, misalignment, and improper separation.
- (2) Check contact support members for deformation causing misalignment or improper contact operation.
- (3) With the finger, test movable contacts for sluggish action or sticking at any point of travel in either direction. Examine for physical damage to armature. Also check for foreign matter between end of pole piece and armature.
- (4) Inspect for loose coil, corrosion, loose leads or terminals, and for cuts and other damage to coil.
- (5) Inspect for loose, broken, brittle, or charred insulation on coil or leads, between contact support members, and between terminals on relay.
- (6) Inspect for bent, loose, or broken terminals.
- (7) Check relay mountings and mechanical parts for looseness and physical damage or corrosion.

R. Resistors, Fixed Composition.

Inspect these resistors for cracked, broken, blistered, or charred bodies and loose, broken, poorly soldered, or corroded terminal connections.

S. Resistors, Fixed Wire-Wound.

Inspect these resistors for signs of heating; cracked, broken, or charred insulation; loose, poorly soldered, broken, or corroded terminal connections; and loose mountings.

T. Trim Potentiometers.

Inspect trim potentiometers for corrosion of shafts, cases, and other visible parts, loose mountings, and physical damage. Rotate the shaft, where possible, to determine whether the action is too rough, too loose, or too tight.



U. Switches, Rotary.

- (1) Examine for bent, weak, broken, or deformed contacts.
- (2) Check for corrosion and damage to contact plating.
- (3) Inspect for cracked or broken contact insulation.
- (4) Check to see that movable contacts are free to rotate properly without binding throughout entire excursion.
- (5) Inspect components mounted on switch for physical damage.

V. Terminal Connection, Soldered.

- (1) Inspect for cold-soldered or resin joints. These joints present a porous or dull, rough appearance. Check for strength of bond using the point of a tool.
- (2) Examine for excess solder, protrusions from the joint, pieces adhering to adjacent insulation, and particles lodged between joints, conductor, or other parts.
- (3) Inspect for insufficient solder and unsoldered strands of wire protruding from conductor at joint. Also look for insulation that is stripped back too far from joint or badly frayed at joint.
- (4) Inspect for corrosion (verdigris) on copper conductor at the joint.

W. Transformers and Reactors.

Check all parts for signs of excessive heating, physical damage to case, cracked or broken ceramic insulators, and other irregularities. Also check for corroded, poorly soldered, or loose terminals and loose, broken, or missing mounting hardware.

X. Wiring.

Inspect open and laced wiring of chassis, terminal boards, and parts of equipment by checking insulation for physical damage and charring. Check wires for breakage and for improper dress in relation to adjacent wiring and chassis.



860E-2 Distance Measuring Equipment - Repair

1. GENERAL.

The repair or replacement of damaged parts is largely an uncomplicated matter involving standard techniques. However, the following notes should be observed.

2. CHASSIS SERVICING TECHNIQUES.

Whenever maintenance is performed on the chassis cabling of this equipment, a check should be made to be certain that the cable is still wired correctly. This may be done by continuity checks through the cable. See the testing section of this manual.

3. CAPACITOR SERVICING TECHNIQUES.

Capacitors which are suspected of being faulty, or new capacitors which are installed in the equipment, should be checked according to the following procedures as applicable. New capacitors may have low insulation resistance, particularly paper-dielectric capacitors which have been stored for long periods under tropical conditions.

A. Mica- or Ceramic-Dielectric Capacitors.

Measure the insulation resistance between the terminals using a megohm bridge, such as the Biddle 628-TA. The direct-current potential used for this test should be at least 100 volts, but not more than the rated voltage, and the electrification time should not exceed two minutes. The insulation resistance measured at a temperature between 20°C (68°F) and 25°C (77°F) and a relative humidity of between 0 and 80 percent should be greater than 7500 megohms. (Any condensed moisture on the case of the capacitor should be removed before making this test.)

B. Paper-Dielectric Capacitors.

Measure the insulation resistance by the procedure given in paragraph A. In addition, for capacitors which are sealed in metallic cases (and in which the case is not a terminal), insulation resistance should be measured between each terminal and the case. The resistance in this case should be greater than 300 megohms.

C. Tantalytic Capacitors.

Measure the leakage current of the capacitor. The leakage current with 60 volts applied at room temperature (20°C (68°F)) should be less than 30 ua. Be sure that the applied voltage is of the correct polarity. Measure the leakage current between the two terminals of the capacitors.



860E-2 Distance Measuring Equipment - Repair

1. GENERAL.

The repair or replacement of damaged parts is largely an uncomplicated matter involving standard techniques. However, the following notes should be observed.

2. CHASSIS SERVICING TECHNIQUES.

Whenever maintenance is performed on the chassis cabling of this equipment, a check should be made to be certain that the cable is still wired correctly. This may be done by continuity checks through the cable. See the testing section of this manual.

3. CAPACITOR SERVICING TECHNIQUES.

Capacitors which are suspected of being faulty, or new capacitors which are installed in the equipment, should be checked according to the following procedures as applicable. New capacitors may have low insulation resistance, particularly paper-dielectric capacitors which have been stored for long periods under tropical conditions.

A. Mica- or Ceramic-Dielectric Capacitors.

Measure the insulation resistance between the terminals using a megohm bridge, such as the Biddle 628-TA. The direct-current potential used for this test should be at least 100 volts, but not more than the rated voltage, and the electrification time should not exceed two minutes. The insulation resistance measured at a temperature between 20°C (68°F) and 25°C (77°F) and a relative humidity of between 0 and 80 percent should be greater than 7500 megohms. (Any condensed moisture in the case of the capacitor should be removed before making this test.)

B. Paper-Dielectric Capacitors.

Measure the insulation resistance by the procedure given in paragraph A. In addition, for capacitors which are sealed in metallic cases (and in which the case is not a terminal), insulation resistance should be measured between each terminal and the case. The resistance in this case should be greater than 300 megohms.

C. Tantalytic Capacitors.

Measure the leakage current of the capacitor. The leakage current with 60 volts applied at room temperature (20°C (68°F)) should be less than 30 ua. Be sure that the applied voltage is of the correct polarity. Measure the leakage current between the two terminals of the capacitors.



860E-2 Distance Measuring Equipment - Assembly

1. GENERAL.

The following instructions cover the assembly of 860E-2 Distance Measuring Equipment. This section also includes mechanical and electrical adjustment procedures that are to be performed during assembly.

These assembly instructions do not contain any reference to the soldering of lead wires except where required for clarity. If lead wires are unsoldered for any reason, mechanically secure the wiring with a solder of composition SN60. Secure wiring to mechanical components with nylon lacing cord.

Liquid-stake the threads of all screws not having other means of locking.

Figure 501 is a list of all lubricants used during assembly.

2. ASSEMBLY OF 860E-2 DISTANCE MEASURING EQUIPMENT.

A. Assembly of Distance Mechanism Module. (Refer to figure 111.)

- (1) Mount motor-rate generator (154) and units and tens synchro control transmitters (149, 150) to top gear plate (164) with three synchro locking lugs per component.
- (2) Mount two potentiometers R1 and R2 (127, 139) and synchro resolver (124) to front gear plate (140) with three synchro locking lugs per component.
- (3) If removed, mount flathead screw (158) to underside of top gear plate (164), and mount standoff (157) to upper side of top gear plate (164).
- (4) Press top gear plate (164) to front gear plate (140). Make sure bevel transfer gears (56, 117) mesh. Secure top gear plate (164) to front gear plate with three screws (49) and lock washers (51).
- (5) Mount 2 side plates (141, 142) and bottom plate (19), and secure to front gear plate (140) and top gear plate (164) with 12 screws (20, 49, 143) and 8 lock washers (51, 144).
- (6) Mount units indicator idler gear (55) to bevel gear shaft (58); then mount split-hub pinion (113) to other bevel gear shaft (117) located in front gear plate (140). Collar of split-hub pinion must be adjacent to front gear plate. Adjust units idler gear (55) so that there is no play in the bevel shafts. If bevel gear (56) was removed from its respective shaft, adjust bevel gear (56) for minimum backlash by taking out all end play in both bevel gear shafts and adjusting bevel gear (56) axially on its respective shaft for minimum backlash. Mount and secure collars (52, 114) to units idler gear and split-hub pinion.
- (7) Mount first stage gear (36).
- (8) Mount second stage gear (35).
- (9) Mount units gear (34), and secure to synchro control transmitter shaft (149) with collar (32).

NOTE: Adjust units gear axially on its shaft so that the flange in the units gear (29) does not bind in the units indicator idler gear (55).



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- (10) Mount transfer pinion (30) to stub shaft (161) with elongated teeth facing top gear plate (164), and secure with retaining ring (31).
- (11) Mount tens gear (29) to synchro control transmitter (150), and secure with collar (27).
- (12) Mount and secure top retaining plate (21) with two screws (22) and two lock washers (23). Check that the gear train operates smoothly.
- (13) Mount range potentiometer gear assembly (107) to potentiometer R1 (127) shaft and cam gear (104) with cam assembly (99, 100) to potentiometer R2 (139) shaft.

NOTE: Do not secure collars on range potentiometer gear assembly and cam gear.

- (14) Load range potentiometer gear assembly (107) six to eight teeth, and mesh with cam gear (104).
- (15) Mount resolver gear assembly (66) to resolver (124) shaft.
- (16) Load resolver gear assembly (66) four to five teeth, and maintain loading while mounting interstage gear (76). Secure resolver gear assembly (66) with collar (64).
- (17) Mount and secure front retaining plate (71) with three screws (72, 73).
- (18) Adjust range potentiometer gear assembly (107) axially to a point on the potentiometer R1 (127) shaft just before rubbing occurs between the adjacent faces of range potentiometer gear assembly (107) and the interstage gear (76). Mount and secure collar (105). Check that collar (105) does not rub against the face of interstage gear (76).

- (19) Adjust cam gear (104) so that the face of cam assembly (99, 100) does not rub against the face of range potentiometer gear assembly (107). Mount and secure collar (97).
- (20) Mount two microswitches S1 and S2 (44, 38) to front gear plate (140) with two screws and four washers per switch.

NOTE: Check that the center of the roller of microswitch S2 (38) actuator arm rides on cam assembly (99, 100). Adjust cam (100) accordingly.

- (21) Mount and secure hundreds indicator gear (89) and hundreds indicator (80) with two screws (79), and one retaining ring (90).
- (22) Mount and secure units indicator dial (25) to collar (52) with two screws (26).
- (23) Perform alignment procedure as directed in the testing section of this manual.
- (24) Replace top cover (1) using two screws (2) and lock washers (3).
- (25) Replace side covers (7, 10) using 12 screws (8, 11) and lock washers (9, 12).
- (26) Replace four captive screws (4) and their retaining rings (95).

B. Assembly of Receiver Transmitter Module.

- (1) Assembly of Power Amplifier Subassembly. (Refer to figure 110.)

- (a) Replacing Choke.

1. Slide insulators over plate leads and solder leads to choke (14, 17).
2. Install upper insulator (10), choke (14, 17) short insulator (12, 15) and long insulator (13, 16) through bottom of casting.



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After wrapping assembly tightly with Mylar tape 0.001 inch thick (Collins part number 014-0876-00), coat outside diameter and ends with silicone grease (Collins part number 005-0201-00). There should be no more than 0.0005-inch clearance between outside diameter and hole after installation. This is a critical assembly procedure.

NOTE: This assembly must be kept clean and free of dirt.

3. Attach and solder upper plate lead.
 4. Install C-ring (11) and upper cap (8).
 5. Install C-ring (11) and lower cap (9).
- (b) Replacing Tuning Slug.
1. Replace Teflon insert (157).
 2. Slide tuning slug (94, 124, 140, 156) into cavity. Orient notch in slug so that it is aligned with block (29).
 3. Replace lower spacer (19, 21). Contact assembly (20, 22) and upper spacer (19, 21).

After wrapping assembly tightly with Mylar tape 0.001 inch thick (Collins part number 014-0875-00), coat outside diameter, junction of spacers (19, 21) with contact assembly (20, 22), and ends with silicone grease (Collins part number 005-0201-00). There should be no more than 0.0005-inch clearance between outside diameter and hole after installation. This is a critical assembly procedure.

NOTE: This assembly must be kept clean and free of dirt.

4. Replace locking ring (18).
- (c) Replacing Tubes.
1. Push tube (7) into contact assembly until it is firmly seated.
 2. Replace cavity cover (4, 5, 6).
- (d) Replacing Tuning Slug Follower.
1. Slide follower (76, 81) over lead, if lead has been unsoldered.
 2. Resolder lead.
 3. Assemble follower to tuning slug rods (94, 124, 140, 156).
 4. Secure follower with two self-locking nuts (72, 77).
 5. Replace cylinder block (42), and secure with two screws (44).



- (e) Replacing Cavity Tuning Spring.
 - 1. Slide compression spring (36) over spring guide (73, 78).
 - 2. Assemble nylon seat (35) to end of spring.
 - 3. Replace spring retainer (32, 33), and secure with four screws (34).
- (f) Replacing Cavity Tuning Cam.
 - 1. Coat bore of cam coupling unit (67), bearing surface of shaft (77), and fill lubrication groove with grease (Collins part number 005-0423-00).
 - 2. Assemble cam coupling unit (67) to shaft (177).
 - 3. Replace C-ring (68).
- (g) Tighten setscrews on power amplifier slope, trimmer adjustment arms, and frequency multiplier drive arm to produce adjustment rod torque of 10 to 30 inch-ounces, if these parts have been removed.
- (2) Replacing Channel Selector Subassembly Board. (Refer to figure 102.)
 - (a) Redress wiring harness as necessary.
 - (b) Remount high voltage transformer, if necessary.
 - (c) Replace connector P1, if removed, securing with two screws.
 - (d) Fit wraparound to base of power amplifier casting. Dress wiring harnesses to avoid pinching of leads.
 - (e) Secure wraparound to casting with eight screws.
 - (f) Replace support bracket, and secure with nine screws.
- (3) Replacing High Voltage Transformer T1.
 - (a) Replace transformer housing.
 - (b) Secure housing with five screws located in base and end of wraparound and three inserted in power amplifier casting.
- (4) Assembling Channel Selector. (Refer to figure 109.)
 - (a) Assembling Gear Train.
 - 1. Replace any gears or gear shafts which have been removed, being careful that gears are properly meshed. Lubricate gear teeth, gear posts, and shafts with a light coating of grease (Collins part number 005-0423-00). Lubricate pawl tip and



stop wheel notches (234) of Autopositioner with light coating of grease (Collins part number 005-0423-00). Lubricate bearing of items 20, bearing surfaces of detent arm (86), and shaft (88) (see figure 109) with 2 to 3 drops of instrument oil (Collins part number 005-0535-00).

CAUTION: DO NOT GET ANY LUBRICANT ON ITEM 233. (See figure 109.)

2. Replace solenoid, transformer, or switch, if removed, and solder leads as required.
3. Check or reset clutch torque by adjusting self-locking nut (235). Maintain dynamic torque on clutch assembly at $26 \pm \frac{3}{2}$ inch-ounces. Slot in end of gear shaft (209) may be used as the measurement point.
4. Reassemble gear plates (163, 248).
5. Replace four screws (164, 165).
6. Replace two C-rings (146, 153).
7. Replace four cover screws (104).
8. Replace seven cover screws (100).

NOTE: The following procedure should be followed to maintain correct Autopositioner switch adjustment. Adjust contact arm (196 nearest pawl of solenoid) to make just before tip of pawl disengages notch of stop wheel (234). Adjust remaining contact arm (196) to make when there is 0.015- to 0.030-inch engagement between tip of pawl and face of stop wheel (234).

(b) Replacing Wafer Switch S8 (137).

1. Lubricate switch with light film of lubricant (Collins part number 005-0546-00).
2. Mount wafer on gear plate (163) using two spacers (138) and two screws (139).
3. Attach and solder leads.
4. Replace cover (134), and secure with two screws (135).

(c) Replacing Motor B1.

1. Mount motor (189) on gear plate (248), and attach with two screws (190).
2. Connect and solder leads.



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(d) Replacing Channel Indicator Dials.

1. Slide dials on shaft. Carefully position dials for channel 0.
2. Tighten setscrews.

(e) Assembling Boards and Switch Rotors.

1. Replace any switch rotors removed in precisely the same position noted during disassembly.

NOTE: To gain access to setscrews, it will be necessary to rotate the dials. Contact pressures of dial and rotor contact springs must be maintained or readjusted to 30 ± 5 grams to ensure maximum switch life. Refer to the testing section of this manual for switch rotor alignment procedure.

2. Replace boards and spacers as required.

NOTE: Ground contact on rear of metal board (last board in deck) in switch deck must be centered on fine shaft within $1/64$ inch and adjusted to exert 40 ± 10 grams against end of fine shaft. Lubricate contact and end of fine shaft with a light film of lubricant (Collins part number 005-0546-00).

3. Lubricate all switches with a very light film of lubricant (Collins part number 005-0546-00).

CAUTION: DELRIN SPACERS OF ROTORS (51, 67) MUST BE KEPT CLEAN AND FREE OF GREASE AND DIRT.

(f) Replacing Crystals.

1. Install crystal on board.
2. Trim and bend leads, and secure the crystal to board.
3. Solder leads.
4. Replace resistor and component boards.

(g) Replace dust cover, and secure with 13 screws.

(h) Replacing Channel Selector.

1. Replace T2/K1 inspection plate, and secure with six screws.
2. Tighten the four red-headed captive screws.



OVERHAUL MANUAL

stop wheel notches (234) of Autopositioner with light coating of grease (Collins part number 005-0423-00). Lubricate bearing of items 20, bearing surfaces of detent arm (86), and shaft (88) (see figure 109) with 2 to 3 drops of instrument oil (Collins part number 005-0535-00).

CAUTION: DO NOT GET ANY LUBRICANT ON ITEM 233. (See figure 109.)

2. Replace solenoid, transformer, or switch, if removed, and solder leads as required.
3. Check or reset clutch torque by adjusting self-locking nut (235). Maintain dynamic torque on clutch assembly at $1 \pm 10\%$ inch-pound. Slot in end of gear shaft (209) may be used as the measurement point.
4. Reassemble gear plates (163, 248).
5. Replace four screws (164, 165).
6. Replace two C-rings (146, 153).
7. Replace four cover screws (104).
8. Replace seven cover screws (100).

NOTE: The following procedure should be followed to maintain correct Autopositioner switch adjustment: Adjust contact arm (196) (nearest pawl of solenoid) to make just before tip of pawl disengages notch of stop wheel (234). Adjust remaining contact arm (196) to make when there is 0.005 to 0.015-inch clearance between tip of pawl and face of stop wheel (234).

(b) Replacing Wafer Switch S8 (137).

1. Lubricate switch with light film of lubricant (Collins part number 005-0546-00).
2. Mount wafer on gear plate (163) using two spacers (138) and two screws (139).
3. Attach and solder leads.
4. Replace cover (134), and secure with two screws (135).

(c) Replacing Motor B1.

1. Mount motor (189) on gear plate (248), and attach with two screws (190).
2. Connect and solder leads.



(d) Replacing Channel Indicator Dials.

1. Slide dials on shaft. Carefully position dials for channel 0.
2. Tighten setscrews.

(e) Assembling Boards and Switch Rotors.

1. Replace any switch rotors removed in precisely the same position noted during disassembly.

NOTE: To gain access to setscrews, it will be necessary to rotate the dials. Contact pressures of dial and rotor contact springs must be maintained or readjusted to 30 ± 5 grams to ensure maximum switch life. Refer to the testing section of this manual for switch rotor alignment procedure.

2. Replace boards and spacers as required.

NOTE: Ground contact on rear of metal board (last board in deck) in switch deck must be centered on fine shaft within $1/64$ inch and adjusted to exert 40 ± 10 grams against end of fine shaft. Lubricate contact and end of fine shaft with a light film of lubricant (Collins part number 005-0546-00).

3. Lubricate all switches with a very light film of lubricant (Collins part number 005-0546-00).

CAUTION: DELRIN SPACERS OF ROTORS (51, 67) MUST BE KEPT CLEAN AND FREE OF GREASE AND DIRT.

(f) Replacing Crystals.

1. Install crystal on board.
2. Trim and bend leads, and secure the crystal to board.
3. Solder leads.
4. Replace resistor and component boards.

(g) Replace dust cover, and secure with 13 screws.

(h) Replacing Channel Selector.

1. Replace T2/K1 inspection plate, and secure with six screws.
2. Tighten the four red-headed captive screws.



(5) Assembling Preselector. (Refer to figure 108.)

(a) Replacing Bearing.

1. Extend tuning table (15).
2. Install bearing (9).
3. Install C-ring (10).

(b) Replacing Fixed Conductor.

1. Slide fixed conductor (70 or 71) through bottom of chassis (69).
2. Secure with nut (72) and lockwasher (73).
3. Replace bottom cover (66), and secure with eight screws.

NOTE: Fixed conductors (70, 71) must be assembled in correct cavity according to figure 108.

(c) Replacing Movable Conductor.

1. Lubricate bearing surfaces of movable conductors (23, 24) with fixed conductors (70, 71) with a light coating of lubricating oil (Collins part number 005-0535-00).
2. Install movable conductor (23 or 24) in tuning table (15).
3. Replace locking ring (16).

NOTE: Movable conductors (23, 24) must be assembled in correct cavity according to figure 109. See alignment procedure in test section of this manual for adjustment of movable conductor.

4. Assemble tuning table to chassis, positioning the movable conductors within the fixed conductors.

NOTE: Each finger on fixed conductor must make good contact with movable rods.

5. Install the short guide rod (21), and tighten setscrew (22) on flat of rod.
6. Install the long guide rod (11), but do not secure until compression spring is replaced. (See step (d).)

(d) Replacing Compression Spring.

1. Slide compression spring (14) on long guide rod (11).
2. Install washer (13), and push guide rod into lower boss, making certain that milled face is aligned with setscrew.



3. Tighten setscrew (12).

4. Lubricate 2 Oilite bearings in tuning table (15) with 2 to 3 drops of lubricating oil (Collins part number 005-0535-00). Lubricate bearing slot in tuning table (15) and short guide rod (21) with grease (Collins part number 005-0423-00).

(e) Replacing Preselector Cam and Coupling.

1. Lubricate bearing (30) with 2 or 3 drops of lubricating oil (Collins part number 005-0535-00).

2. Extend tuning slide.

3. Install cam and coupling assembly (25).

4. Replace C-ring (26).

NOTE: After assembly, rack must operate freely without binding. For proper operation, the torque measured at the coupler should not exceed 27 inch-ounces ccw as viewed from coupler side.

(f) Replacing CR1.

1. Install diode CR1 (51), in choke housing (49).

2. Replace choke housing on mixer housing (63). Use wrench to hold choke housing while tightening nut.

(g) Installing Preselector Subassembly.

1. Insert r-f lead into clamp.

2. Rotate preselector cam coupling assembly (25) to align with locating pin on coupling (226) mounted on channel selector worm gear (229). (Refer to figure 109.)

NOTE: To prevent binding, maintain 0.010 ± 0.005 inch between coupler flanges.

3. Tighten r-f clamp.

4. Tighten three red-headed captive screws.

5. Reconnect connector J1.

(6) Assembling I-F Amplifier. (Refer to figure 107.)

(a) Replacing the 6.3- and 10.7-Mc Filters.

1. Install filter on subchassis, and secure with nut and washer.

2. Connect and solder leads, using a 25-watt iron.



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(b) Replace submodule covers, and secure with screws.

(c) Mounting the Subunit.

1. Install the intermediate frequency amplifier on the left side at power amplifier casting. Mate connectors carefully to avoid bending pins.
2. Tighten the four red-headed captive screws.
3. Join connector J8. Use one wrench to hold the larger of the two nuts stationary to avoid twisting the r-f lead.

(7) Assembling Frequency Multiplier. (Refer to figure 106.)

(a) Replacing Tuning Slug.

1. Slide tuning slug (21) over contact assembly (20).
2. Install tuning rod (23), and press in pin (22).
3. Wrap slug outside diameter carefully and tightly with 2 turns of pressure sensitive Teflon tape 0.0035 inch thick (Collins part number 014-0587-00) maximum outside diameter after wrapping must be 0.685.
4. Insert slug in cavity (9, 17), and assemble hardware to base of contact assembly. Slug assembly must operate freely after assembly.
5. Tighten nut (13).
6. Replace lower cover (12), and secure with four screws (33).
7. Install rocker arm housing (11). Align setscrews with milled faces on rod.
8. Tighten setscrews (30), and replace C-rings (10).
9. Insert tuning rod (23) through guide plate (8).
10. Replace cavity (9, 17) on casting being careful to dress plate lead in milled groove so that it is not pinched.
11. Replace the two screws and two self-locking nuts that secure cavity to casting.
12. Secure guide plate (8) with two screws. Slug assembly must operate freely without binding after assembly. It may be necessary to rotate cavity (9, 17) slightly about its locating pin and adjust guide plate (8) to achieve free movement.
13. Replace connector plate (24), and secure with five screws.
14. Lubricate bearing in rocker arm housing (11) and guide plate (8) with 2 to 3 drops of lubricating oil (Collins part number 005-0535-00).



(b) Replacing Tube.

1. Install tube (5) in socket (4).
2. Replace cavity cover (7) and grid contact (6).
3. Secure tube socket with two screws (31).
4. Replace tube cover (3), and secure with three screws (1, 25).

(c) Replacing Capacitor Shaft Coupling.

1. Install coupling on shaft.
2. Tighten setscrews.

NOTE: See test procedure section for alignment of variable capacitor.

(d) Replace front cover, secure with eleven screws, and install rear cover, securing with ten screws.

(e) After assembly, the torque required to rotate unit at coupler should be between 2 and 5-1/2 inch-ounces.

(f) Replacing Frequency Multiplier.

1. Engage coupling.

NOTE: To prevent binding, maintain 0.010 ± 0.005 inch between coupler flanges.

2. Move rocker arm housing (11) so that it will slide over rod.
3. Engage connector, taking care not to bend any pins.
4. Tighten down four captive red-headed screws.

(8) Assembling Modulator.

(a) Replacing Capacitors C4 and C5. (Refer to figure 105.)

1. Install capacitors and replace nuts in mounting block.
2. Mount block to chassis.
3. Attach and solder leads.

(b) Replacing Coils L1 and L2.

1. Mount coil to bracket with screw.
2. Install bracket on chassis.
3. Attach and solder leads.



(b) Replacing Coils L1 and L2.

1. Mount coil to bracket with screw.
2. Install bracket on chassis.
3. Attach and solder leads.

(c) Replace Diodes CR9 and CR10. (Refer to figure 103 and figure 104.)

1. See figure 104 for assembly of diode. Nuts must be torqued from 10-15 inch-pounds.
2. Attach and solder leads, using 25-watt iron.

(d) Replacing Modulator Subassembly.

1. Engage connector P1.
2. Tighten down four captive red-headed screws.

C. Replacement of Modules. (Refer to figure 101.)

(1) Distance Mechanism Module A8.

(a) 200-Mile Distance Mechanism Module (Collins part number 528-0455-004).

Install on the chassis immediately to the rear of the front panel. Tighten the four captive red-headed screws.

(b) 200/300-Mile Distance Mechanism Module (Collins part numbers 528-0470-005 and 528-0470-006).

Install on the chassis immediately to the rear of the front panel. Tighten the four screws as required. (Refer to figure 111A.)

If the 860E-2 Distance Measuring Equipment is being modified to provide 300-mile distance capabilities by installing the 200/300-mile distance mechanism module, the following equipment modifications, adjustments, and tests must be performed to ensure proper functioning of the equipment.

1. Unground cathode of A7CR32 (on board A7) to obtain 200-mile range overridable to 300 miles with override wire FL1-30. User must supply 200/300-mile override capability by grounding P1-30 when (approximately) 300-mile capability is desired. Override control of both P2-19 (short range override) and P1-30 (200-mile override) may be accomplished by one override switch on the pilot's control box, if desired.
2. Check distance circuits alignment by performing steps (12), (13), (14), and (15) under paragraph 4.J in the testing section of this manual.



3. Check distance accuracy by performing steps (1) through (7) and (10) through (27) of paragraph 3.K in the testing section of this manual. (The same test is used when using the Boonton 8925A or Boonton 235A.)

- (2) Echo Protector Circuit A9 (if Used).

Install the EPC so that the connector mates with the proper connector on the chassis. Tighten the three red-headed captive screws.

- (3) Modules A3 Through A7.

Insert each board into its Delrin slides, and push down until the connector is engaged. Note that the boards are color coded and that staggered locating pins prevent improper installation.

- (4) Receiver Transmitter Module A2.

Install the receiver transmitter module to the rear of the boards.

Avoid pinching cable at rear of chassis when replacing module. Tighten six captive screws to secure module to chassis.

COLLINS PART NUMBER	NAME OF LUBRICANT	SPECIFICATION
005-0201-00	Silicone grease	MIL-I-8660
005-0423-00	Grease	MIL-G-3278
005-0535-00	Lubricating oil	MIL-I-6085A
005-0546-00	Lubricant	*None
*Consists of 10 parts by weight of Beacon 325 grease, MIL-G-3278; 45 parts by weight of butyl alcohol; and 45 parts by weight of xylene.		

Lubricants Required
Figure 501



860E-2 Distance Measuring Equipment — Testing

1. GENERAL.

This section presents the procedures for bench-testing the 860E-2 DME. Procedures are first given for a functional check of the equipment. Results obtained will enable the technician to determine if repair or alignment is necessary. If the equipment fails to meet the specification of a particular test, perform the alignment procedures. If alignment fails, refer to the troubleshooting section of this manual.

2. TEST EQUIPMENT AND POWER REQUIREMENTS.

A. Test Equipment.

Refer to the special tools, fixtures, and equipment section for test equipment required for test.

B. Power Sources.

Power for the 860E-2 DME during bench-testing is supplied through the 578D-1 test set. The nominal requirements are as follows: 115 volts ac, 60 Hz; 115 volts ac, 400 Hz; and 28 volts dc.

3. TEST PROCEDURES.

A. Test Setup.

(1) Connect the 860E-2 in the manner required by the test equipment you are using.

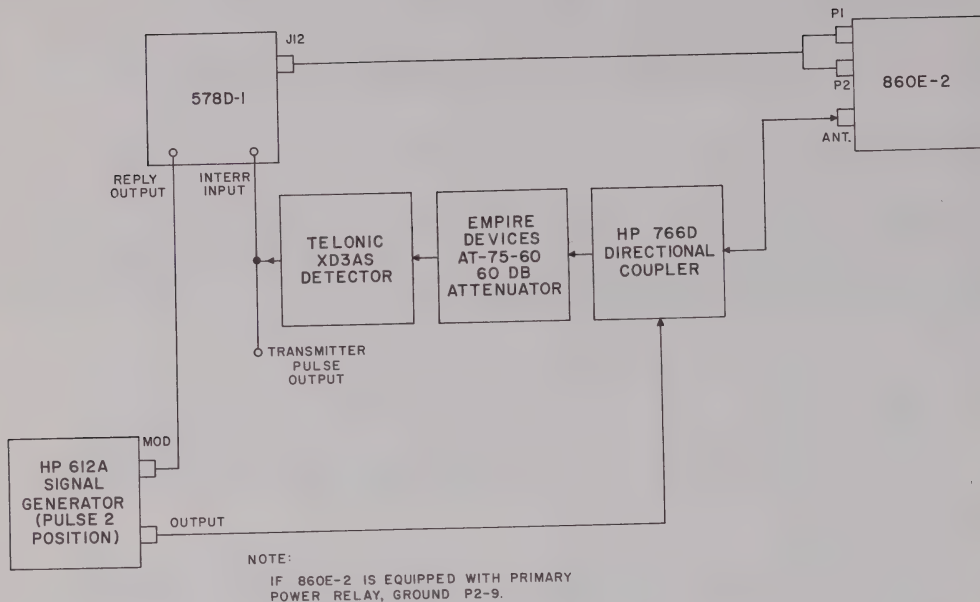
- (a) For testing with the HP-612A signal generator, connect the equipment as shown in figure 701.
- (b) For testing with the Boonton 8925A DME/ATC Test Set, connect the equipment as shown in figure 702. Set the controls on the Boonton 8925A to the initial positions specified in figure 703.

NOTE: The 578D-1 must be modified as specified in Service Bulletin No. 2 in order to use the Boonton 8925A.

- (c) For testing with the Boonton 235A Navigation Aid Test Set, connect the equipment as shown in figure 704.
- (2) Remove transistor A4Q202 from the distance time base generator board to disable the signal-controlled search circuits.

NOTE: Transistor A4Q202 (type 2N1711) must be safely and conveniently stored in an appropriate container for reinstallation.

(3) Apply power to the test equipment, and allow 2 hours for warmup.



Test Setup Using HP-612A Signal Generator
Figure 701

- (4) Set the switches on the 578D-1 to the following positions:

REPLY EFFICIENCY - NORMAL

SYNC SELECTOR - SQUITTER

PULSE SPACING-USEC - 12

DISTANCE MI - 0

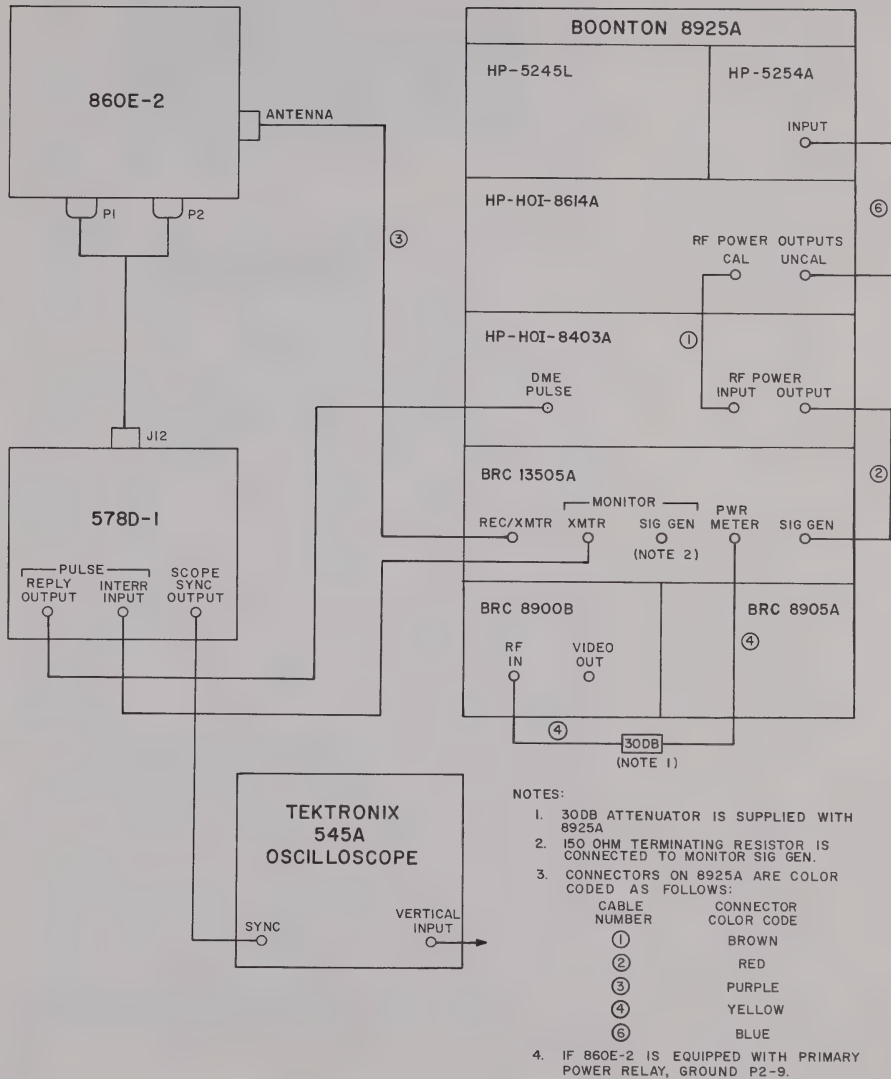
SQUITTER RATE - 2700

DME-OFF - NORMAL

CHANNEL - 00

B. Channeling Test.

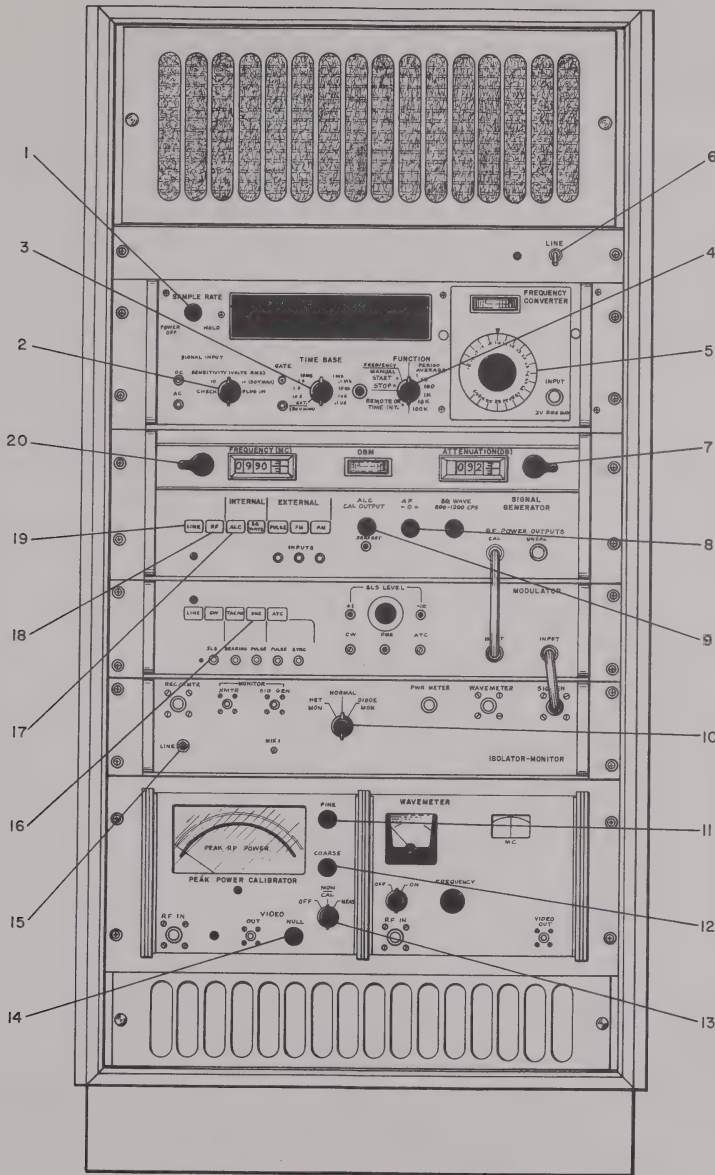
- (1) Set the DME control on the 578D-1 to STBY.



Test Setup Using Boonton 8925A Test Set
Figure 702



OVERHAUL MANUAL



KEY	CONTROL	INITIAL POSITION (IF SIGNIFICANT)
1	SAMPLE RATE	ON (TURN CLOCKWISE)
2	SIGNAL INPT.	PLUS IN
3	TIME BASE	
4	FUNCTION	FREQUENCY
5	MIXING FREQUENCY SELECTOR	
6	LINE	LINE (ON)
7	ATTENUATOR	
8	ΔF	0
9	ALC CAL OUTPUT	
10	FUNCTION	NORMAL
11	FINE	
12	COURSE	
13	FUNCTION	MON/CAL
14	VIDEO NULL	
15	LINE	DEPRESSED (ON)
16	DME	DEPRESSED (ON)
17	INTERNAL-ALC	
18	RF	
19	LINE	DEPRESSED (ON)
20	FREQUENCY	

Boonton 8925A DME/ATC Test Set, Front Panel
Figure 703

FUNCTION

POWER SWITCH FOR THE HP 524L.
 INPUT SELECTOR FOR THE HP 524L.
 TIME BASE SELECTOR FOR THE HP 524L.
 FUNCTION SELECTOR FOR HP 524L.
 FREQUENCY CONTROL FOR THE HP 5254A.

POWER SWITCH AND CIRCUIT BREAKER FOR THE BOONTON 8925A.

CONTROLS HP HOI 8614A OUTPUT LEVEL.
 FINE CONTROL FOR HP HOI 8614A OUTPUT FREQUENCY.

REFERENCE ADJUSTMENT FOR THE HP HOI 8614A AUTOMATIC OUTPUT LEVELING.

SELECTION CONTROL FOR OSCILLOSCOPE MONITOR SIGNAL PROVIDED AT MONITOR SIG GEN CONNECTOR ON THE BRC 13505A. IN THE HET MON POSITION THE SIGNAL IS DERIVED BY HETERODYNING THE MODULATOR OUTPUT WITH A LOCAL OSCILLATOR. IN THE DIODE MON POSITION THE SIGNAL IS THE DIODE DETECTED OUTPUT OF THE MODULATOR.

FINE ADJUSTMENT FOR POWER MEASUREMENT WITH THE BRC 8900B.

COURSE ADJUSTMENT FOR POWER MEASUREMENT WITH THE BRC 8900B.

POWER SWITCH AND FUNCTION SELECTOR FOR THE BRC 8900B.

ADJUSTMENT TO BALANCE OUT DIODE OPERATING BIAS FROM VIDEO APPLIED TO VIDEO OUT CONNECTOR ON THE BRC 8900B.

POWER SWITCH FOR THE BRC 13505A.

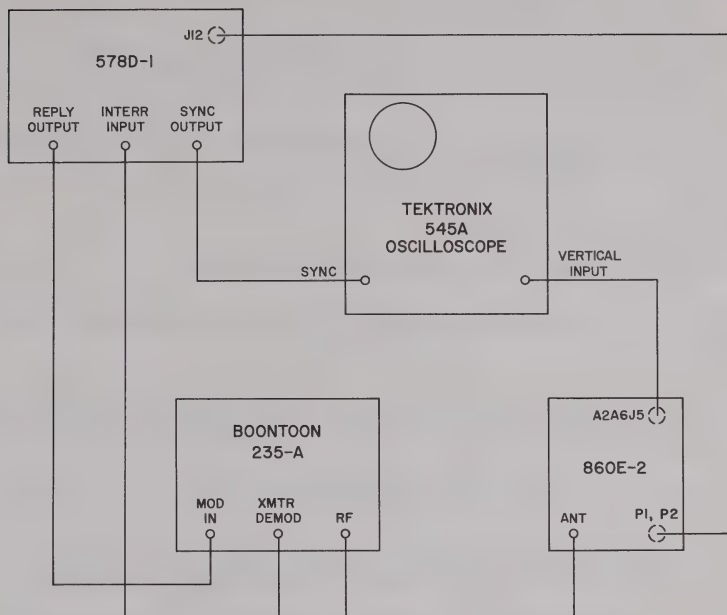
CONNECTS DME REPLY PULSE FROM PULSE CONNECTOR TO THE HP HOI 8403A MODULATOR CIRCUITS.

CONTROLS ACTIVATION OF AUTOMATIC LEVELING OF HP HOI 8403A RF SIGNAL OUTPUT.

CONTROLS APPLICATION OF HP HOI 8403A RF SIGNAL OUTPUT.

POWER SWITCH FOR HP HOI 8403A.

FREQUENCY CONTROL FOR THE HP HOI 8614A.

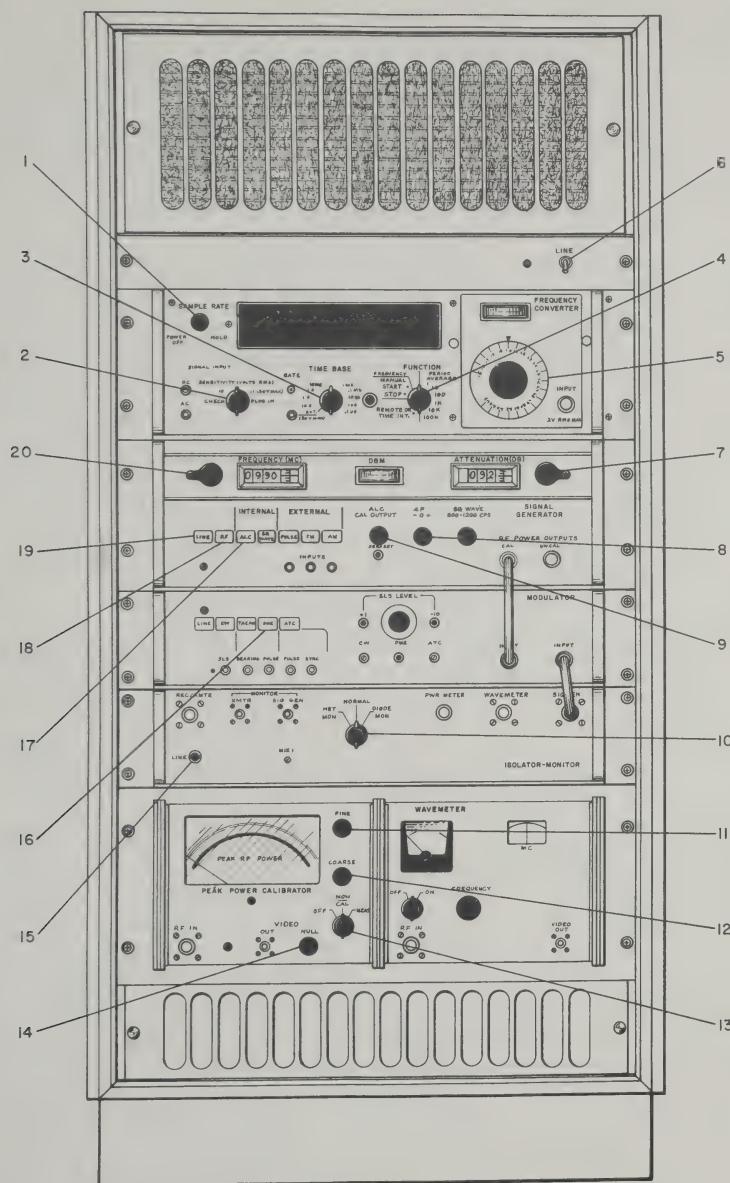


Test Setup Using Boonton 235A Test Set
Figure 704

- (2) Set the CHANNEL selector controls on the 578D-1 to 02. The channel dials on the top of the 860E-2 should indicate channel 2, and the indicator in the pre-selector rack should be in the X-region.
- (3) Repeat step (2) for each of the following channels: 13, 24, 35, 46, 57, 68, 79, 80, 91, 102, 113, and 126.
- (4) Channel the 860E-2 to channel 31 and to channel 30. Measure the channeling time. The channeling time should be not more than 9.5 seconds.
- (5) Set the DME control on the 578D-1 to ON.
- (6) Check that the 860E-2 stops transmitting during the channeling operation. Observe the transmitter pulses with the oscilloscope, using internal sync.
- (7) Depending on the type of test equipment in use, perform one of the following.
 - (a) Using the HP-612A, observe the transmitter pulses at the output of the XD3AS detector.

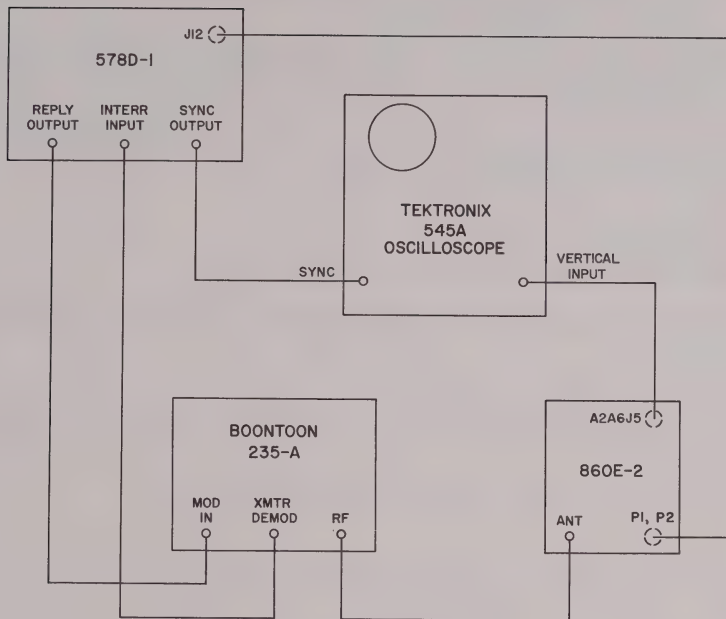


OVERHAUL MANUAL



KEY	CONTROL	INITIAL POSITION (IF SIGNIFICANT)	FUNCTION
1	SAMPLE RATE	ON (TURN CLOCKWISE)	POWER SWITCH FOR THE HP 524L.
2	SIGNAL INP.	PLUS IN	INPUT SELECTOR FOR THE HP 524L.
3	TIME BASE		TIME BASE SELECTOR FOR THE HP 524L.
4	FUNCTION	FREQUENCY	FUNCTION SELECTOR FOR HP 524L.
5	MIXING FREQUENCY SELECTOR		FREQUENCY CONTROL FOR THE HP 5254A.
6	LINE	LINE (ON)	POWER SWITCH AND CIRCUIT BREAKER FOR THE BOONTON 8925A.
7	ATTENUATOR		CONTROLS HP HOI 8614A OUTPUT LEVEL.
8	ΔF	0	FINE CONTROL FOR HP HOI 8614A OUTPUT FREQUENCY.
9	ALC CAL OUTPUT		REFERENCE ADJUSTMENT FOR THE HP HOI 8614A AUTOMATIC OUTPUT LEVELING.
10	FUNCTION	NORMAL	SELECTION CONTROL FOR OSCILLOSCOPE MONITOR SIGNAL PROVIDED AT MONITOR <u>STIC (ON)</u> CONNECTOR ON THE BRC 13505A. IN THE <u>RET MON</u> POSITION THE SIGNAL IS DERIVED BY HETERODYNING THE MODULATOR OUTPUT WITH A LOCAL OSCILLATOR. IN THE <u>DIODE MON</u> POSITION THE SIGNAL IS THE DIODE DETECTED OUTPUT OF THE MODULATOR.
11	FINE		FINE ADJUSTMENT FOR POWER MEASUREMENT WITH THE BRC 8900B.
12	COURSE		COURSE ADJUSTMENT FOR POWER MEASUREMENT WITH THE BRC 8900B.
13	FUNCTION	MON/CAL	POWER SWITCH AND FUNCTION SELECTOR FOR THE BRC 8900B.
14	VIDEO NULL		ADJUSTMENT TO BALANCE OUT DIODE OPERATING BIAS FROM VIDEO APPLIED TO <u>VIDEO OUT</u> CONNECTOR ON THE BRC 8900B.
15	LINE	DEPRESSED (ON)	POWER SWITCH FOR THE BRC 13505A.
16	DME	DEPRESSED (ON)	CONNECTS DME REPLY PULSE FROM <u>PULSE</u> CONNECTOR TO THE HP HOI 8403A MODULATOR CIRCUITS.
17	INTERNAL-ALC		CONTROLS ACTIVATION OF AUTOMATIC LEVELING OF HP HOI 8403A RF SIGNAL OUTPUT.
18	RF		CONTROLS APPLICATION OF HP HOI 8403A RF SIGNAL OUTPUT.
19	LINE	DEPRESSED (ON)	POWER SWITCH FOR HP HOI 8403A.
20	FREQUENCY		FREQUENCY CONTROL FOR THE HP HOI 8614A.

Boonton 8925A DME/ATC Test Set, Front Panel
Figure 703



Test Setup Using Boonton 235A Test Set
Figure 704

- (2) Set the CHANNEL selector controls on the 578D-1 to 02. The channel dials on the top of the 860E-2 should indicate channel 2, and the indicator in the pre-selector rack should be in the X-region.
- (3) Repeat step (2) for each of the following channels: 13, 24, 35, 46, 57, 68, 79, 80, 91, 102, 113, and 126.
- (4) Channel the 860E-2 to channel 31 and to channel 30. Measure the channeling time. The channeling time should be not more than 9.5 seconds.
- (5) Set the DME control on the 578D-1 to ON.
- (6) Check that the 860E-2 stops transmitting during the channeling operation. Observe the transmitter pulses with the oscilloscope, using internal sync.
- (7) Depending on the type of test equipment in use, perform one of the following.
 - (a) Using the HP-612A, observe the transmitter pulses at the output of the XD3AS detector.



(b) Using the Boonton 8925A, observe the transmitter pulses at the MONITOR XMTR on the BRC 13505A.

(c) Using the Boonton 235A, observe the transmitter pulses at the XMTR DEMOD jack.

(8) Check that the distance indication does not move during channeling and that the FLAG light is off during channeling.

C. Transmitter Frequency Test.

(1) Position the DME control on the 578D-1 to STBY.

(2) Connect the frequency counter to A2A2J4 on the frequency multiplier amplifier subassembly.

(3) Position CHANNEL selector controls on the 578D-1 to the channels listed in figure 705. The frequency at A2A2J4 should be within the limits listed in figure 705.

(4) Remove the frequency counter from the 860E-2.

CHANNEL	FREQUENCY AT A2A2J4 (MHz)	
	NOT LESS THAN	NOT MORE THAN
1	85.4140	85.4192
12	86.3308	86.3360
23	87.2474	87.2526
34	88.1639	88.1693
45	89.0807	89.0861
56	89.9973	90.0027
67	90.9139	90.9193
78	91.8307	91.8361
89	92.7472	92.7528
95	93.2472	93.2528

Table of Transmitter Frequencies (Sheet 1 of 2)
Figure 705



CHANNEL	FREQUENCY AT A2A2J4 (MHz)	
	NOT LESS THAN	NOT MORE THAN
100	93.6638	93.6694
112	94.6638	94.6694
126	95.8305	95.8363

Table of Transmitter Frequencies (Sheet 2 of 2)
Figure 705

D. Transmitter Power Output Test.

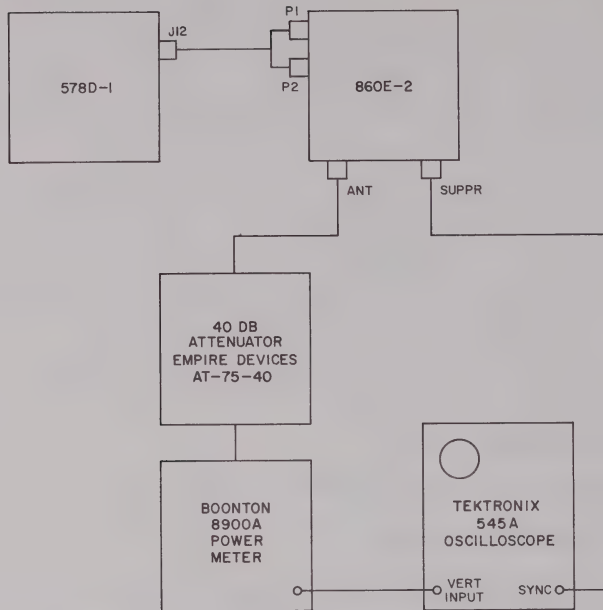
- (1) Position the DME control on the 578D-1 to ON.
- (2) Channel the 860E-2 to channel 1.
- (3) Depending on the type of test equipment in use, perform step (a), (b), or (c).

(a) Using the HP-612A, proceed as follows:

1. Connect the 860E-2 in the test setup shown in figure 706.
2. The peak power output should be 29 dbw or more. The difference in power between the first and second pulse should be not more than 1 db.
3. Repeat power readings for the channels listed in figure 705.

(b) Using the Boonton 8925A, proceed as follows: (Refer to figure 703.)

1. Set the function switch (13) to the MON/CAL position.
2. With the oscilloscope adjusted for free-running horizontal sweep operation, connect the oscilloscope vertical input to the BRC 8900B VIDEO OUT connector.
3. Adjust the VIDEO NULL control (14) until the 2 horizontal lines, observed on the oscilloscope, are superimposed. Do not change VIDEO NULL control adjustment in subsequent steps.
4. Set the function switch (13) to the MEAS position.
5. Adjust the COURSE control (12) and the FINE control (11) until the horizontal line on the oscilloscope coincides with the peak of the pulse displayed.



NOTE:
IF 860E-2 IS EQUIPPED WITH PRIMARY POWER RELAY, GROUND P2-9

Transmitter Power Output Test Setup
Using HP-612A Signal Generator
Figure 706

6. Read the peak rf power on the BRC 8900B PEAK POWER CALIBRATOR meter. The peak rf power should be 29 dbw or more (-1 DB on the meter represents 29 dbw).

NOTE: 0 DB on the BRC 8900B PEAK POWER CALIBRATOR meter represents 30 dbw of measured rf power when the 30-db attenuator is connected to the RF IN connector.

7. Repeat steps 5 and 6 for the channels listed in figure 705.
- (c) Using the Boonton 235A, proceed as follows:
1. Select channel 1 on the 235A.

NOTE: A channel is selected on the 235A by rotating the coarse and fine adjustment knobs until the proper channel shows in the CH window and the receive frequency for this channel shows in the MC window.



2. Position the DME control on the 578D-1 to ON.
 3. Set the function selector switch of the 235A to PWR MEAS. Note the relative power level on the meter of the 235A.
 4. Set the NORMAL/PWR/MEAS switch of the 235A to PWR MEAS.
 5. Adjust the db control to obtain the same reading on the meter as in step 3. Note the DBW IN reading on the DBM OUT/DBW IN indicator. This reading should be 29 dbw or more.
 6. Repeat steps 3 through 5 for the channels listed in figure 705.
- (4) Position the DME control on the 578D-1 to STBY.
 - (5) Remove transistor A5Q17 from distance interrogation generator board A5. Road map location is A1.
 - (6) Position the DME control on the 578D-1 to ON.
 - (7) Channel the 860E-2 to channel 1. (Using the 235A, also select channel 1 on the 235A.)
 - (8) Measure the peak power output. It should be not more than 0.2 db below the power output previously obtained on channel 1.
 - (9) Position the DME control on the 578D-1 to STBY.
 - (10) Replace transistor A5Q17.
 - (11) Remove the drive from frequency multiplier amplifier subassembly A2A2 to the power amplifier by disconnecting the cable from A2A2J3.
 - (12) Position the DME control on the 578D-1 to ON, and check that there is no power output from the 860E-2 on the channels listed in figure 705.
 - (13) Position the DME control on the 578D-1 to STBY.

E. Transmitter Pulse Characteristics.

- (1) Depending on the type of test equipment in use, perform step (a), (b), or (c).
 - (a) Using the HP-612A, connect the equipment as shown in figure 706.
 - (b) Using the Boonton 8925A, connect the equipment as shown in figure 702.
 1. Disconnect the 578D-1 lead from the BRC 13505A MONITOR XMTR connector.
 2. Move the oscilloscope lead from the BRC 8900B VIDEO OUT connector to the BRC 13505A MONITOR XMTR connector.



3. Load the oscilloscope vertical input with a 150-ohm terminating resistor.

(c) Using the Boonton 235A, connect the equipment as shown in figure 704.

1. Disconnect the XMTR DEMOD jack on the 235A from the INTERR INPUT jack on the 578D-1, and connect the vertical input on the oscilloscope to the XMTR DEMOD jack.

2. Connect the scope sync to the SUPPR connector on the 860E-2.

(2) Channel the 860E-2 to channel 1.

(3) Set the DME control switch on the 578D-1 to ON.

(4) Measure the rise time from the 10- to 90-percent voltage points on the leading edge of the first and second transmit pulses. The rise time should be not more than 3 us.

(5) Measure the decay time from the 90- to 10-percent voltage points on the first and second transmit pulses. The decay time should not be more than 3 us.

(6) Measure the pulse duration of the first and second transmit pulses at the 50-percent voltage points. The pulse duration should be from 3.0 to 4.0 us.

(7) Check that the tops of the first and second pulses are round and smooth.

(8) Repeat steps (4) through (7) for channels 64 and 126.

F. Pulse Code Spacing.

(1) Using the test setup in paragraph 3.E. above, channel the 860E-2 to channel 1.

(2) Measure the time between the 50-percent voltage point on the leading edge of the first pulse and the 50-percent voltage point on the leading edge of the second pulse. The time should be from 11.8 to 12.2 us.

(3) Repeat step (2) for channels 63 and 126.

G. Receiver Sensitivity and Search Speed Test.

(1) Depending on the type of test equipment in use, perform step (a), (b), or (c).

(a) Using the HP-612A, connect the equipment as shown in figure 701.

(b) Using the Boonton 8925A, connect the equipment as shown in figure 702. Remove the 150-ohm termination resistor from the oscilloscope vertical input.

(c) Using the Boonton 235A, connect the equipment as shown in figure 704.

(2) Position the DME control on the 578D-1 to ON.



- (3) Connect the oscilloscope to A2A6J5 with external sync connected to 578D-1 (SYNC SELECTOR on SQUITTER).
 - (4) Channel the 860E-2 to channel 1, and adjust the output of the signal generator to 962 MHz at a level below agc threshold. (Using the 235A, also select channel 1 on the 235A.)
 - (5) Connect the headphones to the IDENT OUTPUT jack on the 578D-1.
 - (6) Adjust A2A6C4 to obtain maximum pulse voltage and minimum noise at A2A6J5 as viewed on the oscilloscope.
 - (7) Adjust the signal level of the signal generator to -92 dbm.
 - (8) Measure distance lock-on sensitivity for channels 1, 12, 23, 34, 45, 56, 67, 78, 89, 100, 112, and 126. The distance lock-on sensitivity is the minimum signal level required for the 860E-2 to lock on 4 out of 5 trials.
 - (9) On the channel having the lowest distance lock-on sensitivity, adjust if. gain control A3R74 to obtain -92-dbm sensitivity.
 - (10) On the same channel as used in step (9), decrease the signal level into the 860E-2 until a minimum readable tone is observed in the headphones. The signal level should be not more than -93 dbm.
- NOTE: The loss due to the directional coupler and coaxial cables must be considered in measuring receiver sensitivity.
- (11) Position the DISTANCE-MI control on the 578D-1 to RANGE A, and adjust the SPEED control to establish an outbound reply at 2000 knots.
 - (12) On the same channel used in step (9), determine that the signal level required for distance lock-on is not more than -91 dbm.
 - (13) Repeat step (12) for an inbound signal at 2000 knots.
 - (14) On the same channel used in step (10), set the signal level of the signal generator to -90 dbm. Remove reply pulses by disconnecting the INTERR INPUT to the 578D-1. Measure the time required for 5 full search cycles. This time should be less than 80 seconds.

H. AGC Action Test.

- (1) Connect the 860E-2 in the test setup as in paragraph 3.G.
- (2) Position the switches on the 578D-1 as follows:

REPLY EFFICIENCY - NORMAL

SYNC SELECTOR - SQUITTER

PULSE SPACING-USEC - 12



DISTANCE-MI - 0

DME - STBY

SEARCH LIMIT - NORMAL

CHANNEL - 33

Power Control - OPERATE

SQUITTER RATE - 2700

- (3) Connect the oscilloscope to A2A6J5 and the external SYNC to the SCOPE SYNC OUTPUT jack on the 578D-1.
- (4) Adjust the signal level of the signal generator to -90 dbm.
- (5) Adjust the frequency of the signal generator to obtain maximum video pulse amplitude at A2A6J5 as viewed on the oscilloscope.
- (6) Position the PULSE SPACING-USEC control on the 578D-1 to 6.

NOTE: The 578D-1 test set in use may not have a PULSE SPACING-USEC setting of 6: in that case, use a setting of 8.

- (7) Adjust the signal level from the signal generator to -20 dbm.
- (8) Connect the Triplet 630A to A2A6J4. The voltage should be the no-signal value.
- (9) Position the PULSE SPACING-USEC control on the 578D-1 to 11.5. The agc voltage at A2A6J4 should increase to between -9.5 and -7.5 volts dc.
- (10) Position the PULSE SPACING-USEC control on the 578D-1 to 16. The agc voltage at A2A6J4 should be the same as in step (8).
- (11) Position the PULSE SPACING-USEC control on the 578D-1 to 12.5. The agc voltage at A2A6J4 should be the same as in step (9).

I. Receiver Decoder Selectivity Test.

- (1) Connect the 860E-2 in the test setup as in paragraph 3.H.
- (2) Channel the 860E-2 to channel 10, and adjust the frequency of the signal generator to 971 MHz.
- (3) With the PULSE SPACING-USEC control on the 578D-1 set to 11.5, 12, and 12.5 respectively, measure distance lock-on sensitivity and minimum readable tone sensitivity. The sensitivities should be the same for all three spacings.

NOTE: In the next step, the preferred setting for the PULSE SPACING-USEC control on the 578D-1 is 8; however, if the particular modification of the 578D-1 in use does not have that setting, use 6.



- (4) Set the PULSE SPACING-USEC control on the 578D-1 to 8. There should be no tone output or distance lock-on with input levels of -20, -35, -48, -70, and -90 dbm from the signal generator. Also check that the age voltage falls to the no-signal value.
- (5) Repeat step (4) above with the PULSE SPACING-USEC control on the 578D-1 set to 16.

NOTE: The following steps check the deblocker circuit.

- (6) Disconnect one end of A3C10.
- (7) Set the PULSE SPACING-USEC control on the 578D-1 to 12.
- (8) Connect the oscilloscope to A3J7. Connect the external sync jack on the oscilloscope to the SYNC OUTPUT jack on the 578D-1, and position the SYNC SELECTOR on the 578D-1 to SQUITTER.
- (9) Increase the signal level from the signal generator until reply pulses are first observed at A3J7. This level should be 10 to 20 db above minimum lock-on sensitivity.

NOTE: Pulses at A3J7 are present only momentarily.

- (10) Reconnect A3C10.

J. Interrogation Pulse Repetition Rate Test.

- (1) Connect a frequency counter to the SUPP jack on the front panel of the 860E-2.
- (2) Operate the 860E-2 in search, and measure the prf using a 10-second average. The search prf should be from 144 to 148 pps.
- (3) Operate the 860E-2 in track, and measure the prf using a 10-second average. The track prf should be from 20 to 22.
- (4) Disconnect the frequency counter from the SUPP jack, and connect the oscilloscope. The pulse spacing should not be constant during search or track.

K. Distance Accuracy Test.

- (1) Adjust the signal level of the signal generator to -70 dbm at 972 MHz. (Select channel 11 on the 235A, if used.)
- (2) Channel the 860E-2 to channel 11 in the search mode.
- (3) Connect the oscilloscope to A4J8 with the vertical sensitivity set to 0.5 volt/cm.
- (4) Adjust A4R44 to obtain minimum amplitude variation of the observed sine wave.

NOTE: The 578D-1 must be calibrated for distance accuracy, and a calibration chart must be used for the following adjustments.



- (5) Position the DISTANCE-MI control on the 578D-1 to 0.
- (6) Adjust A4R11 in the distance time base generator board so the distance indication on the 578D-1 is 0 mile.
- (7) Connect the frequency counter to A4J3, and measure the frequency of the 4045.6-Hz timing oscillator. The frequency should be 4045.6 ± 1 Hz.
- (8) Remove the frequency counter from the 860E-2.
- (9) Channel the 860E-2 to channel 17. (Select channel 17 on the 235A, if used.)
- (10) Position the SQUITTER RATE control to 2700 and REPLY EFFICIENCY to NORMAL.
- (11) Adjust the signal level of the signal generator to 1 db above minimum lock-on level.
- (12) Position the DISTANCE-MI control on the 578D-1 to 0. After the 860E-2 locks on and the flag light has been on for 5 seconds, determine the distance error. The error should be within 0.1 mile.
- (13) Repeat step (12) for the other fixed ranges on the 578D-1. The error for the ranges should be within 0.2 mile.
- (14) Increase the signal level of the signal generator to -80 dbm.
- (15) Repeat step (12) for all fixed ranges on the 578D-1. The error for the 0-, 18-, and 36-mile ranges should be within 0.1 mile. The error for the other ranges should be within 0.15 mile.
- (16) Increase the signal level of the signal generator to -20 dbm.
- (17) Repeat step (12) for all fixed ranges of the 578D-1. The error for the 0-, 18-, and 36-mile ranges should be within 0.1 mile. The error for the other ranges should be within 0.15 mile.
- (18) Adjust the output level of the signal generator to -80 dbm.
- (19) Position the SQUITTER RATE control on the 578D-1 to SUPPR.
- (20) Connect the oscilloscope to A6J4 with the sync connected to the SYNC OUTPUT jack on the 578D-1 and the SYNC SELECTOR positioned to REPLY.
- (21) Position the DISTANCE-MI control to 90.
- (22) After the 860E-2 has locked on, observe the position of the 50-percent voltage point on the leading edge of the range gate at A6J4.
- (23) Position the DISTANCE-MI control on the 578D-1 to RANGE A.



(24)' Adjust the SPEED control on the 578D-1 to obtain an inbound signal at approximately 2000 knots. After the 860E-2 has tracked the inbound signal for 15 seconds, observe the maximum excursion of the 50-percent voltage point on the range gate from the location observed in step (22). It should be not more than 0.6 us.

(25) Repeat step (24) using a 2000-knot outbound signal.

L. Search Mode Test.

- (1) Connect the oscilloscope to test point A2A3J4. Set the oscilloscope to internal sync.
- (2) Adjust the output of the signal generator to a level below minimum lock-on.
- (3) Channel the 860E-2 to channel 31.
- (4) Position the DME control on the 578D-1 to ON.
- (5) Position the SEARCH LIMIT switch on the 578D-1 to NORMAL. The response of the 860E-2 versus type is listed in figure 707.
- (6) Repeat steps (4) and (5) for channels 17, 28, 40, 56, and 57. The correct response is listed in figure 707.
- (7) Position the SEARCH LIMIT control on the 578D-1 to OVERRIDE.
- (8) Repeat steps (4), (5), and (6). The correct response is listed in figure 708.
- (9) Channel the 860E-2 to channel 16, and position the SEARCH LIMIT control on the 578D-1 to NORMAL.
- (10) Position the DME control on the 578D-1 to OFF when the distance indication is below 50 miles.
- (11) Position the DME control on the 578D-1 to ON. The distance indicator should be stopped during the 60-second time delay, and when search begins, it should be inbound with no pulses on the oscilloscope.
- (12) Repeat steps (10) and (11) for the following channels: 17 with SEARCH LIMIT switch in NORMAL, 17 with SEARCH LIMIT switch in OVERRIDE, and 56 with SEARCH LIMIT switch in OVERRIDE. The results should be the same as in step (11).
- (13) Channel the 860E-2 to channel 16 with the SEARCH LIMIT switch in NORMAL.
- (14) Position the DME control on the 578D-1 to STANDBY when the distance indicator is greater than 50 miles. The distance indicator should be stopped when the DME control is in STANDBY.
- (15) After the DME control has been in the STANDBY position for 70 seconds, switch the DME control to ON. The initial direction of search should be outbound.



TYPE OF 860E-2	RESPONSE
TVOR overridable and ILS not overridable	Channels 31, 17, 28, 40, and 56: search to 50 miles, turn around, and slew to 0 with no pulses on the oscilloscope during inbound slew. Channel 57: complete 200-mile search cycle.
TVOR overridable and ILS overridable	Same as above.
TVOR permanently overridden and ILS overridable	Channels 28, 40, and 56: search to 50 miles, turn around, and slew to 0 with no pulses on oscilloscope during inbound slew. Channels 31, 17, and 57: complete 200-mile search cycle
TVOR permanently overridden and ILS permanently overridden	Complete 200-mile search cycle on all channels.
NOTE: The 50-mile turnaround point is a standard adjustment; the 860E-2 may have the limit set anywhere between 10 and 70 miles.	

Search Mode Response (NORMAL)
Figure 707

TYPE OF 860E-2	RESPONSE
TVOR overridable and ILS not overridable	Channels 17, 31, and 57: complete 200-mile search cycle. Channels 28, 40, and 56: search to 50 miles, turn around, and slew to 0 with no pulses on the oscilloscope during inbound slew.
TVOR overridable and ILS overridable	Complete 200-mile search cycle on all channels.
TVOR permanently overridden and ILS overridable	Complete 200-mile search cycle on all channels.
TVOR permanently overridden and ILS permanently overridden	Complete 200-mile search cycle on all channels.

Search Mode Response (OVERRIDE)
Figure 708



- (16) Repeat steps (13), (14), and (15) for the channels and conditions listed in figure 709 and check for the listed results.

NOTE: Omit steps (17) and (18) if the 860E-2 under test has TVOR channels permanently overridden.

- (17) Channel the 860E-2 to channel 43 with the SEARCH LIMIT switch in OVERRIDE position.
- (18) When the distance indication is above 50 miles, switch the SEARCH LIMIT switch to NORMAL. The 860E-2 should immediately begin inbound search.
- (19) Channel the 860E-2 to channel 18 with the SEARCH LIMIT switch to override.
- (20) Adjust the output of the signal generator to -80 dbm at 979 MHz.
- (21) Position the DISTANCE-MI control on the 578D-1 to 18 miles.
- (22) After the 860E-2 has locked on, switch the DISTANCE-MI control in the 578D-1 to 0 mile. After the memory period, the 860E-2 should search inbound to slightly less than 0 mile, reverse, and lock on at zero.
- (23) Position the DISTANCE-MI control on the 578D-1 to 18 miles.

CHANNEL	SEARCH LIMIT	INITIAL INDICATOR POSITION (miles)	INITIAL SEARCH DIRECTION
17	NORMAL	Over 50	Inbound
17	OVERRIDE	Over 50	Outbound
56	NORMAL	Over 50	Inbound
56	OVERRIDE	Over 50	Inbound
17	NORMAL	Below 50	Inbound
17	OVERRIDE	Below 50	Inbound
56	NORMAL	Below 50	Inbound
56	OVERRIDE	Below 50	Inbound

Initial Search Direction
Figure 709



- (24) After the 860E-2 has locked on, switch the DME control from ON to STANDBY and back to ON. The 860E-2 should immediately slew to slightly less than 0 mile, reverse, and lock on at 18 miles.
- (25) Repeat steps (19) through (24) with the 860E-2 on channel 17 and the signal generator set to 978 MHz. The results should be the same.
- (26) Repeat steps (19) through (24) with the 860E-2 on channel 1 and the signal generator set to 962 MHz. The results should be the same.
- (27) With the 860E-2 on channel 1 and the signal generator set to 962 MHz, position the DISTANCE-MI switch to 108 miles and allow to lock on.
- (28) Switch the DISTANCE-MI control to 126 miles. After the memory period, the 860E-2 should search outbound and lock on at 126 miles.
- (29) With the SEARCH LIMIT control in the OVERRIDE position, repeat steps (27) and (28) with the 860E-2 on channel 27 and the signal generator set to 988 MHz.
- (30) Position the SQUITTER RATE control on the 578D-1 to SUPPR, 860E-2 on channel 27, the search limit control in the override position, and the signal generator to 988 MHz.
- (31) Position the DISTANCE-MI control on the 578D-1 to RANGE A, and position the SPEED control slightly to the right of center to provide an outbound reply at about 200 knots. The 860E-2 should track smoothly across the 50-mile range limit switch.
- (32) Position the DISTANCE-MI control on the 578D-1 to 18 miles.
- (33) Channel the 860E-2 to channel 1, and set the signal generator to 962 MHz.
- (34) After the 860E-2 has locked on, channel the 860E-2 to channel 21. Within 1 second after channel 21 is reached, the 860E-2 should search inbound.

M. Memory and Prememory Test.

- (1) Channel the 860E-2 to channel 43, and adjust the signal generator to -80 dbm at 1004 MHz.
- (2) Position the DISTANCE-MI control on the 578D-1 to 0 mile.
- (3) Position the SQUITTER RATE control on the 578D-1 to IDENT.
- (4) When the 860E-2 is searching, switch the SQUITTER RATE control to 2700. Measure the time from the instant the distance indicator stops turning to the time the FLAG light goes on. This time (prememory time) should be not more than 1.5 seconds.
- (5) Position the DISTANCE-MI control on the 578D-1 to RANGE A.



- (6) Adjust the SPEED control on the 578D-1 to obtain an outbound reply signal at about 2000 knots.
- (7) When the 860E-2 is tracking the signal, switch off the reply signals from the signal generator. Measure the time from the moment the reply signal is turned off until the FLAG light goes out (flag time) and the time from the moment the reply signal is turned off until the 860E-2 goes into search (memory time); observe the action of the indicator dials during memory. The 860E-2 response, depending on model and channel, should be as listed in figure 710.

	CHANNEL 30 ILS NOT OVERRIDABLE		CHANNEL 43 OVERRIDDEN		INDICATOR ACTION
	MEMORY TIME (seconds)	FLAG TIME (seconds)	MEMORY TIME (seconds)	FLAG TIME (seconds)	
Velocity memory and slow flag	NMT 5.5	NMT 5.5	10 $\pm$ 1.5	10 $\pm$ 1.5	Continue to track at 2000 knots
Static memory and slow flag	NMT 5.5	NMT 5.5	10 $\pm$ 1.5	10 $\pm$ 1.5	Stops upon loss of signal
Velocity memory and fast flag	NMT 5.5	2 to 3	10 $\pm$ 1.5	2 to 3	Continue to track at 2000 knots
Static memory and fast flag	NMT 5.5	2 to 3	10 $\pm$ 1.5	2 to 3	Stops upon loss of signal

Table of Memory and Flag Response
Figure 710

N. Self-Test Circuit Test.

- (1) Channel the 860E-2 to channel 11, and adjust the signal generator to -80 dbm at 972 MHz.

NOTE: The TEST switch on the 860E-2 or the SELF TEST switch on the 578D-1 must be used to provide a ground to P1-21 on the 860E-2. If neither switch is available, an spst switch may be installed on the 578D-1. One side of the switch should be connected to ground, and the other side should be connected to P1-21. In steps that follow, the switch is referred to as the SELF TEST switch.

- (2) Operate the SELF TEST switch to ground P1-21.
- (3) After the 860E-2 has locked on the self-test signal, adjust A7R79 to obtain a 0-mile indication on the 578D-1.



- (4) Operate the SELF TEST switch to remove ground from P1-21.
- (5) Position the DISTANCE-MI control on the 578D-1 to 18 miles.
- (6) Operate the SELF TEST switch to ground P1-21. The memory time on the 860E-2 should be canceled, and the 860E-2 should slew inbound to less than 0 mile, reverse, and lock on at 0 ± 0.05 mile.
- (7) Operate the SELF TEST switch to remove ground from P1-21. After normal memory period, the DME should break lock, go to 18 miles, and lock on.

O. Bearing Output Characteristics Test.

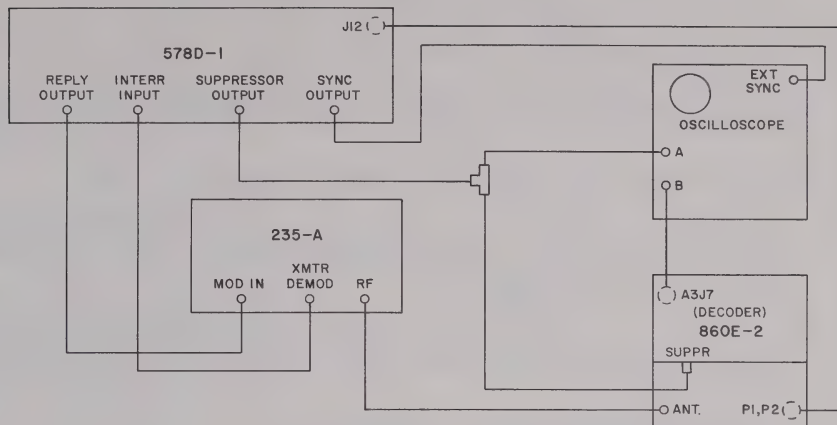
- (1) Channel the 860E-2 to channel 1, and set the 578D-1 SQUITTER RATE control to 2700.
- (2) Adjust the output of the signal generator to -85 dbm at 962 MHz.
- (3) Connect the oscilloscope to A3J8. The peak amplitude of the signals as measured on the oscilloscope should be not less than 3.0 volts.
- (4) Repeat steps (2) and (3) for signal generator output levels of -70 dbm, -40 dbm, and -20 dbm. The peak amplitude should be not less than 3.0 volts with a maximum variation of not more than 20 percent of $\frac{E_{\max} + E_{\min.}}{2}$.

P. Suppression Pulse Characteristics Test.

- (1) Connect a 300-ohm resistor and an 1850-pf capacitor in parallel across the SUPPR jack on the front panel of the 860E-2. (Using 235A, connect equipment as shown in figure 711.)
- (2) Connect the oscilloscope across the load.
- (3) Measure the pulse amplitude. It should be 22 to 30 volts positive.
- (4) Measure the pulse duration at the 20-volt level. It should be 48 to 53 μ s.
- (5) Measure the pulse rise time from 0 to 20 volts. It should be not more than 1 μ s.
- (6) Measure the pulse decay time from 20 to 0 volts. It should be not more than 2 μ s.
- (7) Measure the pulse droop. It should be not more than 20 percent.

Q. Suppression Pulse Input Test.

- (1) Connect the SUPPRESSOR OUTPUT from the 578D-1 to the SUPPR jack on the front of the 860E-2 and to one vertical input of the dual-track oscilloscope. On the other vertical input of the dual-trace oscilloscope, observe the video pulses at test point A3J7. (Using 235A, connect equipment as shown in figure 711.)



Suppression Test Setup Using Boonton 235A Test Set
Figure 711

- (2) Set the 578D-1 SYNC SELECTOR to REPLY.
- (3) Turn the SUPPRESSOR adjust screw on the 578D-1 fully counterclockwise.
- (4) Align the suppression pulses with the video pulses.
- (5) Increase the amplitude of the suppression pulses by turning the SUPPRESSOR adjust screw on the 578D-1 until the video pulses at A3J7 are suppressed. The amplitude of the suppression pulses should be not more than 15 volts.

R. Signal-Controlled Search Test.

- (1) Replace transistor A4Q202 removed in paragraph 3.A.(2).
- (2) Channel the 860E-2 to channel 1.
- (3) Adjust the output of the signal generator to -70 dbm at 962 MHz.
- (4) Set the 578D-1 SQUITTER RATE control to 700.
- (5) Set the DISTANCE-MI control on the 578D-1 to 198.
- (6) Adjust A4R204 in the counterclockwise direction until the indicator is completely stopped between 0 and 50 miles. It will not stop beyond 50 miles, but will search to 0 mile.



- (7) Slowly adjust A4R204 in the clockwise direction until the indicator is rotating freely without evidence of stopping at less than 50 miles.
- (8) Set the 578D-1 SQUITTER RATE control to 2700.
- (9) Adjust the output level of the signal generator until the 860E-2 just locks on. The output level should be not more than -92 dbm.

NOTE: Refer to paragraph 3.G. for receiver sensitivity test.

- (10) Decrease the output level of the signal generator until the indicator stops rotating between 0 and 50 miles. The signal level should be not more than 10 db below the level obtained in step (9).
- (11) Slowly increase the signal level until the indicator rotates freely without evidence of halting. The signal level should be not less than 1 db below the level obtained in step (9).

S. Echo Protector Circuit Test (Some Late Models).

- (1) For this test, it will be necessary to connect a single-pole, single-throw switch in series with a 1000-pf capacitor between J23 and J30 on the 578D-1 test set. J23 and J30 are located on the top of the main chassis of the 578D-1 and are accessible after the top cover is removed.
- (2) Position the DISTANCE-MI control on the 578D-1 to 36. (Switch added in step (1) must be open.)
- (3) Adjust the output of the signal generator to achieve lock-on of the DME at 36 miles.
- (4) Close the switch connected in step (1).
- (5) The DME should break lock, slew inbound, and lock on at 0 ± 1 mile.

4. ALIGNMENT PROCEDURES.

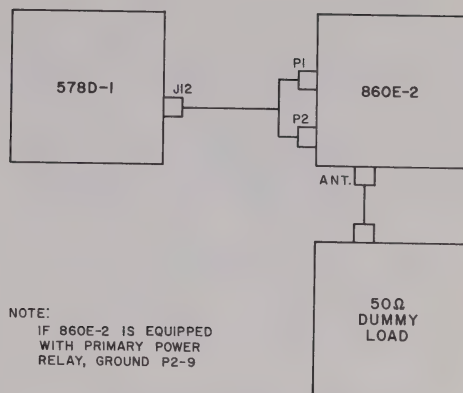
NOTE: The alignment procedures must be performed in the order given.

A. Test Setup.

- (1) Connect cable W-1 to the 860E-2 and to J12 on the 578D-1 as shown in figure 712.
- (2) Position the DME control on the 578D-1 to OFF.
- (3) Apply power to the test equipment, and allow 15 minutes warmup time.
- (4) Connect the Fluke dc voltmeter to A2A6J2 and chassis ground.
- (5) Adjust A1R9 for an indication of -18 volts dc on the voltmeter.



- (6) Disconnect the Fluke dc voltmeter.
- (7) Connect the Fluke dc voltmeter to A2A6J3 and chassis ground.
- (8) Adjust A1R4 for an indication of +10 volts dc on the voltmeter.
- (9) Disconnect the Fluke dc voltmeter.
- (10) Disable signal-controlled search by removing transistor A4Q202 from distance time base generator board A4 (road map coordinates E-F 19 on the A4 board).



Basic Alignment Setup
Figure 712

NOTE: Transistor A4Q202 (type 2N1711) must be safely and conveniently stored in an appropriate container for reinsertion in board A4.

B. Time Delay Adjustment.

NOTE: Mixer crystal (A2A5 CR1) can be damaged if the transmitter is turned on and the preselector is not properly adjusted. If it is suspected that the preselector is out of alignment, remove CR1 (51, figure 108). CR1 must be replaced before starting preselector alignment and crystal current adjustment, paragraph 4.G.

- (1) Connect the dc voltmeter to test point A7J3.
- (2) Adjust resistor A1R17 to the midrange position.
- (3) Position the DME control on the 578D-1 to ON.
- (4) Using a stopwatch, measure the time from the moment the DME control is moved to ON to the moment the voltage at A7J3 instantaneously rises from a negative value to approximately +5 volts dc. If necessary, adjust A1R17 to achieve a time delay of 60 seconds.

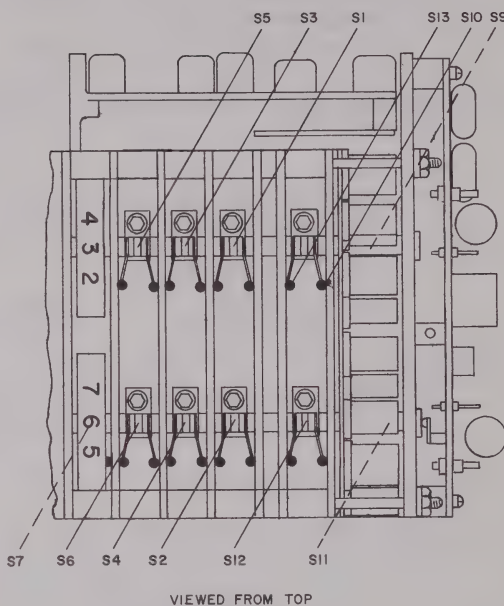
C. Channel Selector Alignment.

- (1) Position the 1-tooth gear on the mc shaft (shaft driving switch S2, fine shaft) so that it is just disengaging the mating idler gear on channel 00. Autopositioner pawl must be in any one of the slots.



- (2) Position the CHANNEL selector dials to 00.
- (3) Align switches S1 and S2 as shown in figure 714. For location of the switches, see figure 713.
- (4) Align the contact arms on switches S3, S5, and S9 so they are parallel to the contact arm on S1.
- (5) Align the contact arms on switches S4, S6, S7, and S11 so they are parallel to the contact arm on S2.
- (6) Align switches S10 and S12 as shown in figure 715.

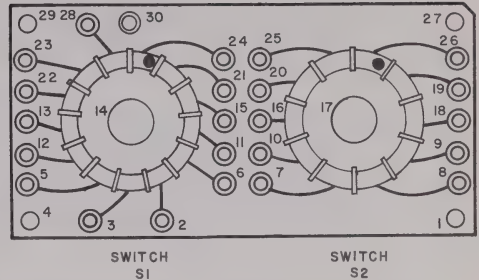
NOTE: Dial setscrews (2 per dial), and rotor clamping screws (1 per rotor) should be tightened lightly in an accessible position, rotated for correct angular alignment for channel 00, and tightened fully after channeling to accessible position. Contact pressure of all switches except S8 should be adjusted to have a contact pressure of 40 ± 10 , -5 grams.



Switch Location
Figure 713

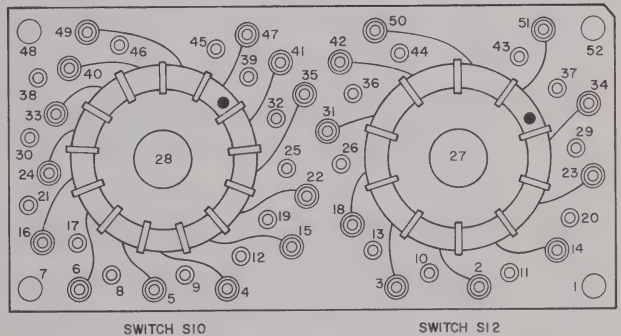
- (7) Position the CHANNEL selector switches on the 578D-1 to 01.
- (8) Align switch S8 as shown in figure 716.
- (9) Position the DME control on the 578D-1 to STBY.
- (10) Position the preselector cam until the locating mark on the cam is in direct alignment with the cam alignment mark on the preselector assembly.
- (11) Rotate the power amplifier cam in the clockwise direction, as viewed from the front of the 860E-2, until the cam follower is 3 to 5 degrees beyond the recess in the cam.

- (12) Position the CHANNEL selector switches on the 578D-1 to 126.
- (13) If necessary, readjust the power amplifier cam so the cam follower is 3 to 5 degrees from the high point on the cam.
- (14) Position the CHANNEL selector switches on the 578D-1 to 01.
- (15) Repeat steps (11) through (14) until the travel of the power amplifier cam is centered with respect to the follower.



Switches S1 and S2 Alignment
Figure 714

- (16) Relay K1 must be set up so the contacts farthest from the solenoid make before the contacts nearest the solenoid. The contacts nearest the solenoid must make just before the pawl is out of the stop-wheel notch. To achieve this condition, adjust the contact arm (196, figure 109) nearest the solenoid (237) to make when the tip of the pawl assembly (239) is 0.002 to 0.015 inch into the notch in the stop wheel (234). Adjust the contact arm (196) farthest from the solenoid (237) to make when the tip of the pawl assembly (239) is 0.015 to 0.030 inch into the notch in the stop wheel (234).



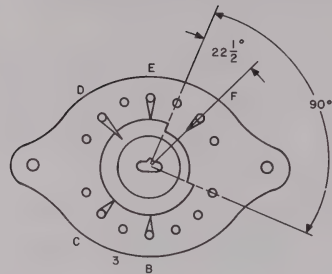
Switches S10 and S12 Alignment
Figure 715

D. Crystal Oscillator Alignment.

- (1) Position the DME control on the 578D-1 to STBY.
- (2) Remove the dust cover from the switch deck of the channel selector.



- (3) Connect the frequency counter, through a 20-pf capacitor, to A2A1C16 on the crystal oscillator unit.
- (4) Position the CHANNEL selector switches on the 578D-1 to 01.
- (5) Adjust capacitor A2A1C3 to obtain a reading of 9.9046 MHz on the frequency counter.
- (6) Connect the frequency counter to A2A2J4 on the frequency multiplier amplifier subassembly.
- (7) Adjust capacitor A2A1C10 to obtain a reading of 85.4166 MHz on the frequency counter.



AS VIEWED FROM REAR OF RADIO

Switch S8 Alignment
Figure 716

- (8) Disconnect the frequency counter.
- (9) Connect the spectrum analyzer to A2A1P2 through a 20-db pad.
- (10) Position the CHANNEL selector switches on the 578D-1 to channels 1, 63, and 126.
- (11) Adjust capacitor A2A1C17 to obtain a maximum power output on channels 1, 63, and 126 as indicated on the spectrum analyzer. Use an HP-608D to calibrate the vertical response on the spectrum analyzer. The power output should exceed -12 dbm.
- (12) Position the CHANNEL selector switches on the 578D-1 to 95.
- (13) Adjust capacitor A2A1C19 to obtain a minimum indication of 63.0361 MHz on the spectrum analyzer.
- (14) Disconnect the spectrum analyzer.

E. Frequency Multiplier Amplifier Alignment.

- (1) Tracked Filter Alignment.
 - (a) Remove the outside cover from frequency multiplier amplifier subassembly A2A2.
 - (b) Position the DME control on the 578D-1 to STBY.
 - (c) Position the CHANNEL selector controls on the 578D-1 to channel 126.
 - (d) Loosen the coupler on the capacitor drive assembly.



- (e) Adjust the rotor of C4A, C4B, C4C, and C4D to the fully open position. The leading edge of each rotor must be just outside the visible edge of each stator.
- (f) Tighten the coupler on the drive assembly.
- (g) Channel the 860E-2 to 1 and back to 125 by using the CHANNEL selector controls, and observe that C4A through C4D are properly aligned.
- (h) Connect the probe of rf voltmeter to the junction of A2A2C5 and the second filter section.
- (i) Adjust capacitor A2A2C3 to obtain a maximum indication of the rf voltmeter.
- (j) Connect the probe of the rf voltmeter to the junction of A2A2C8 and the third filter section.
- (k) Adjust capacitor A2A2C6 to obtain a maximum indication on the rf voltmeter.
- (l) Connect the probe of the rf voltmeter to the junction of A2A2C11 and the fourth filter section.
- (m) Adjust capacitor A2A2C9 to obtain a maximum indication on the rf voltmeter.
- (n) Connect the probe of the rf voltmeter to the base of transistor A2A2Q1.
- (o) Adjust capacitor A2A2C12 to obtain a maximum indication on the rf voltmeter.
- (p) Repeat steps (h) through (o) until no further improvement can be made.

NOTE: The following steps are required only if C4A, C4B, C4C, or C4D has been replaced.

- (q) Retain the rf voltmeter on the base of transistor A2A2Q1.
- (r) Channel the 860E-2 to channel 121, and bend the rotor tab adjacent to the stator of C4A to produce maximum indication on the rf voltmeter. Adjust the rotor blades of C4B, C4C, and C4D in a similar manner.
- (s) Repeat step (r) every 10 channels to and including channel 1.
- (t) Repeat steps (q), (r), and (s) as necessary to obtain best tracking.

(2) Stages A2A2Q1 Through A2A2Q4 Alignment.

NOTE: Operate the frequency multiplier amplifier off the 860E-2 on an extender cable.



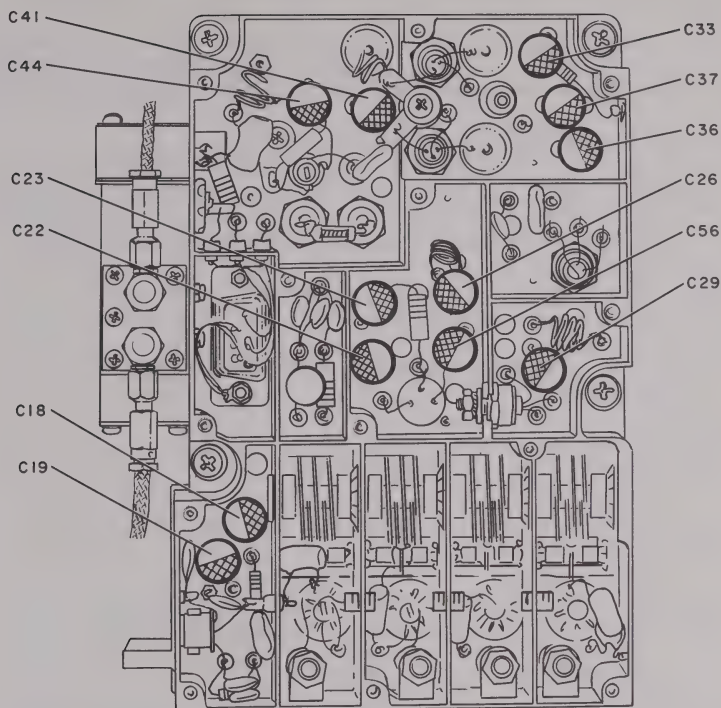
- (a) Disconnect A2A2C13 from the base of A2A2Q1, and connect sweep generator to base of A2A2Q1 with a 1000-pf coupling capacitor.
- (b) Disconnect base lead of A2A2Q5 from its terminal, and connect an output coax to this terminal. To the output coax, connect a 10-db attenuator, a diode detector, and an oscilloscope.
- (c) Adjust sweep generator to sweep 35 to 55 MHz with an output level of 8 mv at 45 MHz.
- (d) Connect an HP-608D signal generator to the base feedthrough of A2A2Q1 in parallel with the sweep generator.

NOTE: Sweep generator and HP-608D signal generator should be connected to the base of A2A2Q1 through a 6-db power divider. The levels of the sweep generator and HP-608D should be adjusted accordingly to obtain the proper level at the base of A2A2Q1.

- (e) Adjust the output of the HP-608D to 42.7 MHz, and place a mark on the oscilloscope face where this signal beats with the sweep generator output.
- (f) Adjust the output of the HP-608D to 45.3 MHz, and place a mark on the oscilloscope face where this signal beats with the sweep generator output.
- (g) Adjust the output of the HP-608D signal generator to 48.0 MHz, and place a mark on the oscilloscope face where this signal zero beats with the output of the sweep generator. Turn off the HP-608D signal generator.
- (h) Adjust trimmer capacitors A2A2C18, C19, C22, C23, C26, C29, and C56 to the positions shown in figure 717.
- (i) Check coil A2A2L24, and ensure that it is clear of the chassis and the windings are approximately 1/16 inch apart.
- (j) Readjust the trimmer capacitors listed in step (h) to obtain maximum passband amplitude without appreciable overcoupling as evidenced by a dip in the center of the passband.
- (k) Accurately determine that the corners of the passband are at 42.7 and 48.0 MHz. If not, repeat step (j).

NOTE: Position of trimmer capacitors during alignment should not deviate more than 30 degrees from position shown in figure 717.

- (l) Disconnect the 10-db attenuator, the diode detector, and the oscilloscope from the test setup, and shut off the sweep generator.
- (m) Connect the power meter to the output coax of step (b).



 INDICATES SILVER PLATE

Frequency Multiplier Amplifier Subassembly A2A2,
Trimmer Capacitor Tuning Position
Figure 717

- (n) Adjust the output of the HP-608D signal generator so the input to A2A2Q1 is -29 dbm, and tune the frequency across the passband (42.7 to 48.0 MHz). Adjust the trimmers listed in step (h) very slightly until a flat passband is obtained with not less than 100-mw output at any frequency in the passband.
- (o) Remove the power meter from the test setup.
- (p) Reconnect the base lead of A2A2Q5 to its terminal.



(3) Stages A2A2Q5 through A2A2V1 and Tripler Tracking Alignment.

NOTE: The tuning slug in T2 should be set close to the center of the transformer.

- (a) Remove the 1000-pf coupling capacitor from the base of A2A2Q1.
- (b) Reconnect A2A2C13 to the base of A2A2Q1.
- (c) Mount the frequency multiplier amplifier subassembly to the 860E-2.
- (d) Connect the power meter through a 10-db pad to A2A2J3, the power amplifier drive terminal.
- (e) Channel the 860E-2 to channel 81.
- (f) Position trimmer capacitors A2A2C33, C36, C37, C41, and C44 as shown in figure 717.
- (g) Check coil A2A2L15, and ensure that it is clear of the chassis and the windings are approximately 1/16 inch apart.
- (h) Attach adjustment cover (Collins part number 756-9666-001) to the frequency multiplier amplifier.
- (i) Adjust C58 for maximum power output. Slightly adjust trimmer listed in step (f) to obtain maximum power output.
- (j) Channel the 860E-2 to channel 1.
- (k) Adjust C58 slightly, if necessary, and tune A2A2C44 to obtain maximum power output.
- (l) Turn A2A2C44 30 degrees in the direction of increasing capacitance.

NOTE: Capacitance of A2A2C44 is maximum when the clockwise edge of the silverplated portion of the rotor is in line with the notch in the stator. See figure 718.

- (m) Channel the 860E-2 to channel 126.
- (n) Adjust the tripler slope control for maximum power output. Slightly adjust A2A2C33, C36, C37, and C41 to obtain maximum power output.
- (o) Check power output across the band. Some slight readjustment of A2A2C33, C36, C41, and C58 and tripler slope control may be required to level the power curve. The power output should not be less than 20 mw at any point in the band.

F. IF. Amplifier Alignment.

- (1) Connect the HP-608D signal generator through a 6-db attenuator to A2A6J8 (input to if. amplifier from preselector).



3A. TEST PROCEDURES USING THE BOONTON 8925A.

A. Test Setup.

- (1) Connect the 860E-2 as shown in figure 714A.

NOTE: The 578D-1 must be modified as specified in Service Bulletin No. 2 in order to use the Boonton 8925A.

- (2) Remove transistor A4Q202 from the distance time base generator board to disable the signal controlled search circuits.

NOTE: Transistor A4Q202 (type 2N1711) must be safely and conveniently stored in an appropriate container for reinstallation.

- (3) Set the controls on the Boonton 8925A to initial positions specified in figure 714B.

- (4) Apply power to the test equipment, and allow 2 hours for warmup.

- (5) Set the switches on the 578D-1 to the following positions:

REPLY EFFICIENCY - NORMAL

SYNC SELECTOR - SQUITTER

PULSE SPACING-USEC - 12

DISTANCE MI - 0

SQUITTER RATE - 2700

DME-OFF - NORMAL

CHANNEL - 00

B. Channeling Test.

- (1) Set the DME control on the 578D-1 to STBY.

- (2) Set the CHANNEL selector controls on the 578D-1 to 02. The channel dials on the top of the 860E-2 should indicate channel 2, and the indicator in the preselector rack should be in the X-region.

- (3) Repeat step (2) for each of the following channels: 13, 24, 35, 46, 57, 68, 79, 80, 91, 102, 113, and 126.

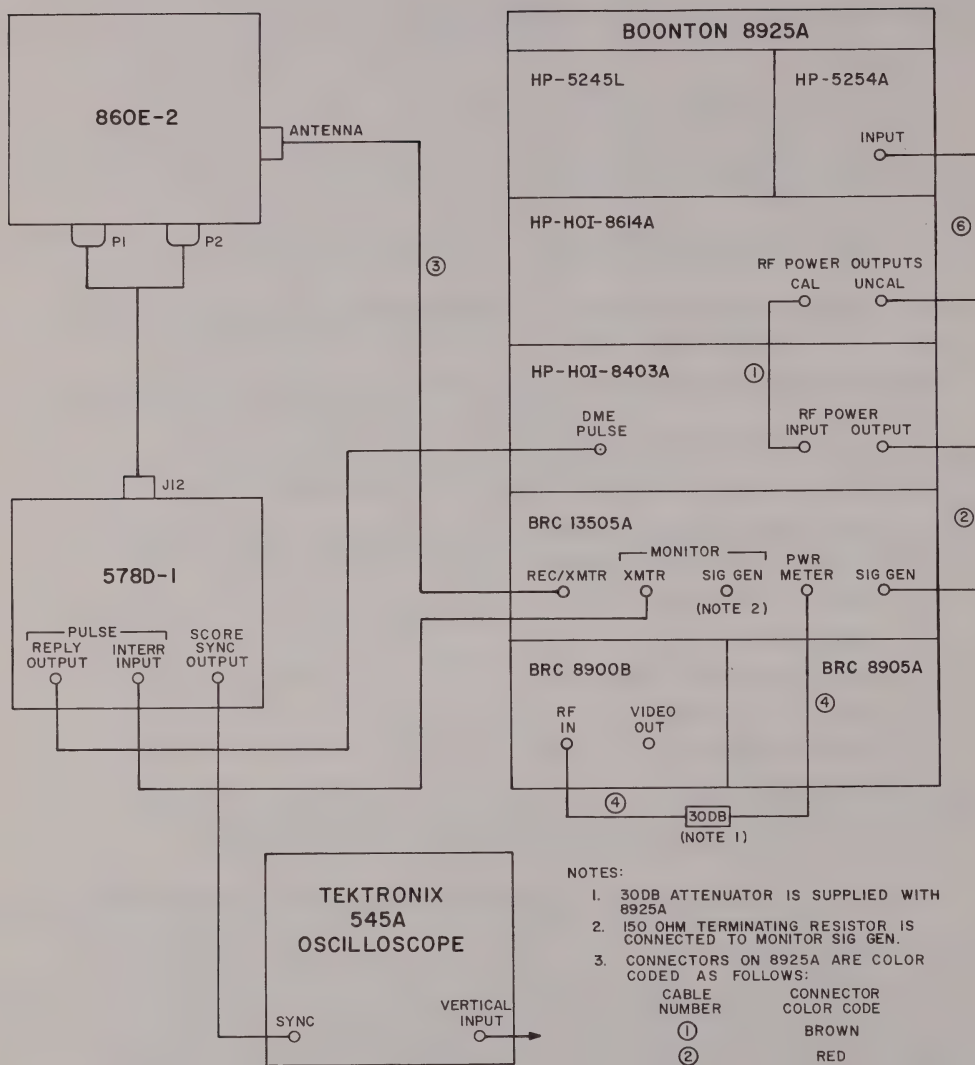
- (4) Channel the 860E-2 to channel 31, and to channel 30. Measure the channeling time. The channeling time should be not more than 9.5 seconds.

- (5) Set the DME control on the 578D-1 to ON.

- (6) Check that the 860E-2 stops transmitting during the channeling operation. Observe the transmitter pulses at the output of the XD3AS detector with the oscilloscope using internal sync.



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NOTES:

- 30DB ATTENUATOR IS SUPPLIED WITH 8925A
- 150 OHM TERMINATING RESISTOR IS CONNECTED TO MONITOR SIG GEN.
- CONNECTORS ON 8925A ARE COLOR CODED AS FOLLOWS:

CABLE NUMBER	CONNECTOR COLOR CODE
①	BROWN
②	RED
③	PURPLE
④	YELLOW
⑤	BLUE
- IF 860E-2 IS EQUIPPED WITH PRIMARY POWER RELAY, GROUND P2-9.

860E-2 Test Setup Using the Boonton 8925A
Figure 714A

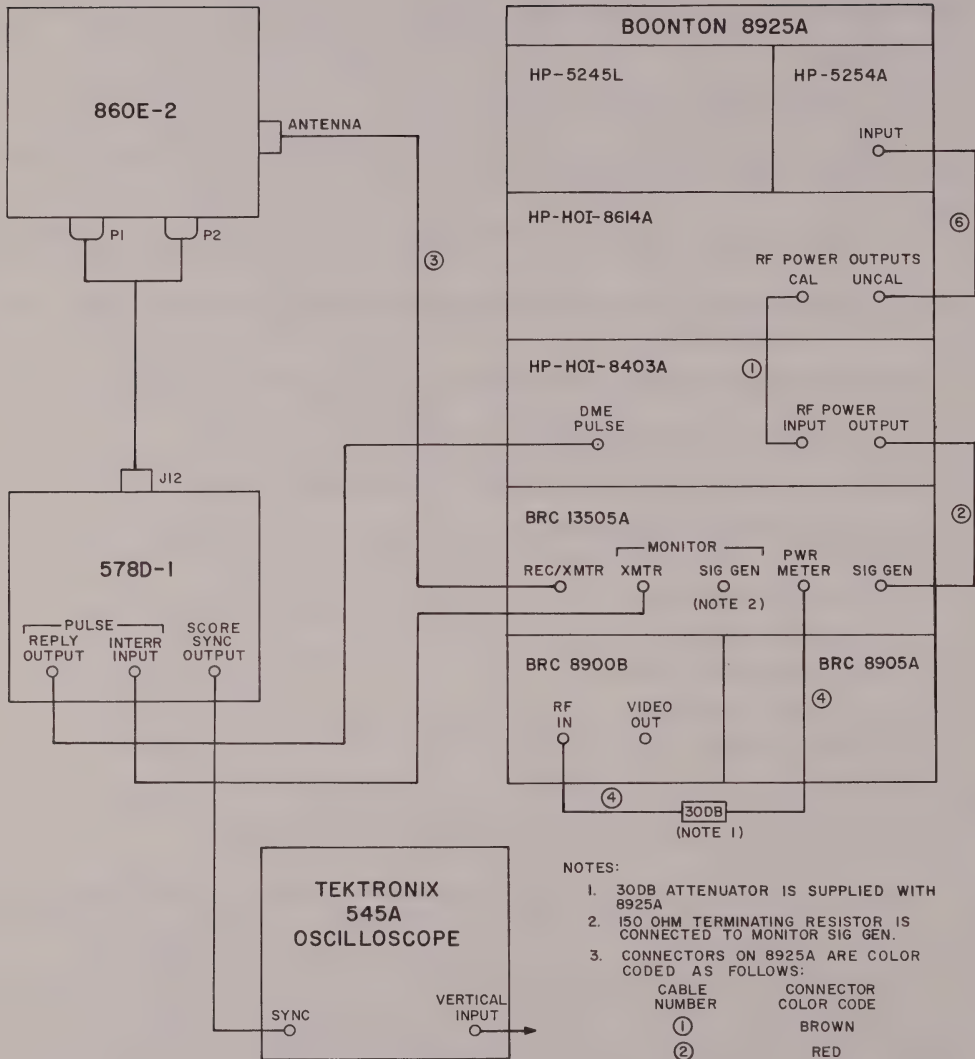
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	INITIAL POSITION (IF SIGNIFICANT)	FUNCTION
E F1	ON (TURN CLOCKWISE)	POWER SWITCH FOR THE HP 524L.
	PLUG IN	INPUT SELECTOR FOR THE HP 524L.
		TIME BASE SELECTOR FOR THE HP 524L.
	FREQUENCY	FUNCTION SELECTOR FOR HP 524L.
		FREQUENCY CONTROL FOR THE HP 5254A.
	LINE (ON)	POWER SWITCH AND CIRCUIT BREAKER FOR THE BOONTON 8925A.
	0	CONTROLS HP HOI 8614A OUTPUT LEVEL.
		FINE CONTROL FOR HP HOI 8614A OUTPUT FREQUENCY.
	INPUT	REFERENCE ADJUSTMENT FOR THE HP HOI 8614A AUTOMATIC OUTPUT LEVELING.
	NORMAL	SELECTION CONTROL FOR OSCILLOSCOPE MONITOR SIGNAL PROVIDED AT MONITOR SIGNAL CONNECTOR ON THE BRC 13505A.
I		IN THE DET MON POSITION THE SIGNAL IS DERIVED BY HETERODYNING THE MODULATOR OUTPUT WITH A LOCAL OSCILLATOR. IN THE DIODE MON POSITION THE SIGNAL IS THE DIODE DETECTED OUTPUT OF THE MODULATOR.
		FINE ADJUSTMENT FOR POWER MEASUREMENT WITH THE BRC 8900B.
		COURSE ADJUSTMENT FOR POWER MEASUREMENT WITH THE BRC 8900B.
	MON/CAL	POWER SWITCH AND FUNCTION SELECTOR FOR THE BRC 8900B.
		ADJUSTMENT TO BALANCE OUT DIODE OPERATING BIAS FROM VIDEO APPLIED TO VIDEO OUT CONNECTOR ON THE BRC 8900B.
	DEPRESSED (ON)	POWER SWITCH FOR THE BRC 13505A.
	DEPRESSED (ON)	CONNECTS DME REPLY PULSE FROM PULSE CONNECTOR TO THE HP HOI 8403A MODULATOR CIRCUITS.
		CONTROLS ACTIVATION OF AUTOMATIC LEVELING OF HP HOI 8403A RF SIGNAL OUTPUT.
		CONTROLS APPLICATION OF HP HOI 8403A RF SIGNAL OUTPUT.
	DEPRESSED (ON)	POWER SWITCH FOR HP HOI 8403A.
		FREQUENCY CONTROL FOR THE HP HOI 8614A.

Boonton 8925A ATC-DME Test Set, Front Panel
Figure 714B



OVERHAUL MANUAL



NOTES:

1. 30DB ATTENUATOR IS SUPPLIED WITH 8925A
2. 150 OHM TERMINATING RESISTOR IS CONNECTED TO MONITOR SIG GEN.
3. CONNECTORS ON 8925A ARE COLOR CODED AS FOLLOWS:

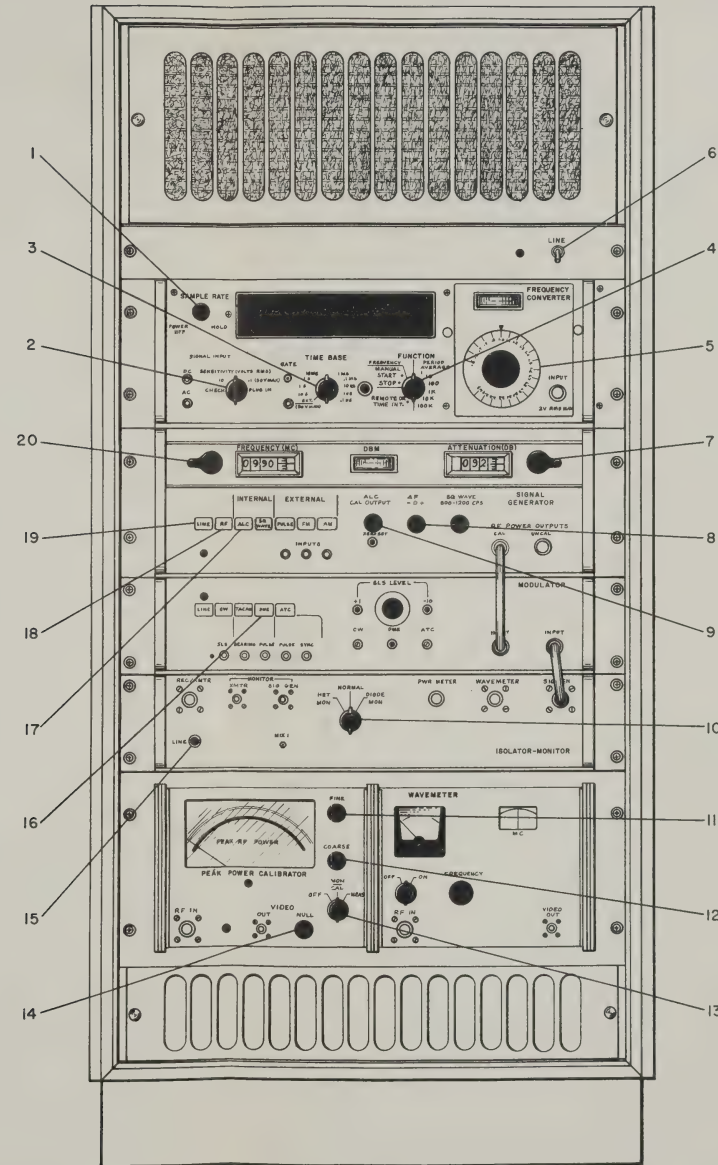
CABLE NUMBER	CONNECTOR COLOR CODE
①	BROWN
②	RED
③	PURPLE
④	YELLOW
⑥	BLUE

4. IF 860E-2 IS EQUIPPED WITH PRIMARY POWER RELAY, GROUND P2-9.

860E-2 Test Setup Using the Boonton 8925A
Figure 714A



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KEY	CONTROL	INITIAL POSITION (IF SIGNIFICANT)	FUNCTION
1	SAMPLE RATE	ON (TURN CLOCKWISE)	POWER SWITCH FOR THE HP 524L.
2	SIGNAL INP.	PLUS IN	INPUT SELECTOR FOR THE HP 524L.
3	TIME BASE		TIME BASE SELECTOR FOR THE HP 524L.
4	FUNCTION	FREQUENC	FUNCTION SELECTOR FOR HP 524L.
5	MIXING FREQUENCY SELECTOR		FREQUENCY CONTROL FOR THE HP 5254A.
6	LINE	LINE (ON)	POWER SWITCH AND CIRCUIT BREAKER FOR THE BOONTON 8925A.
7	ATTENUATOR		CONTROLS HP HOI 8614A OUTPUT LEVEL.
8	ΔF	0	FINE CONTROL FOR HP HOI 8614A OUTPUT FREQUENCY.
9	ALC CAL OUTPUT		REFERENCE ADJUSTMENT FOR THE HP HOI 8614A AUTOMATIC OUTPUT LEVELING.
10	FUNCTION	NORMAL	SELECTION CONTROL FOR OSCILLOSCOPE MONITOR SIGNAL PROVIDED AT MONITOR. SIG GEN CONNECTOR ON THE BRC 13505A. IN THE DET MON POSITION THE SIGNAL IS DERIVED BY HETERODYNING THE MODULATOR OUTPUT WITH A LOCAL OSCILLATOR. IN THE DIODE MON POSITION THE SIGNAL IS THE DIODE DETECTED OUTPUT OF THE MODULATOR.
11	FINE		FINE ADJUSTMENT FOR POWER MEASUREMENT WITH THE BRC 8900B.
12	COURSE		COURSE ADJUSTMENT FOR POWER MEASUREMENT WITH THE BRC 8900B.
13	FUNCTION	MON/CAL	POWER SWITCH AND FUNCTION SELECTOR FOR THE BRC 8900B.
14	VIDEO NULL		ADJUSTMENT TO BALANCE OUT DIODE OPERATING BIAS FROM VIDEO APPLIED TO VIDEO OUT CONNECTOR ON THE BRC 8900B.
15	LINE	DEPRESSED (ON)	POWER SWITCH FOR THE BRC 13505A.
16	DME	DEPRESSED (ON)	CONNECTS DME REPLY PULSE FROM PULSE CONNECTOR TO THE HP HOI 8403A MODULATOR CIRCUITS.
17	INTERNAL ALC		CONTROLS ACTIVATION OF AUTOMATIC LEVELING OF HP HOI 8403A RF SIGNAL OUTPUT.
18	RF		CONTROLS APPLICATION OF HP HOI 8403A RF SIGNAL OUTPUT.
19	LINE	DEPRESSED (ON)	POWER SWITCH FOR HP HOI 8403A.
20	FREQUENCY		FREQUENCY CONTROL FOR THE HP HOI 8614A.

Boonton 8925A ATC-DME Test Set, Front Panel
Figure 714B

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- (7) Check that the distance indication does not move during channeling and that the FLAG light is off during channeling.

C. Transmitter Frequency Test.

- (1) Position the DME control on the 578D-1 to STBY.
- (2) Connect a frequency counter to A2A2J4 on the frequency multiplier amplifier subassembly.
- (3) Position CHANNEL selector controls on the 578D-1 to the channels listed in figure 710. The frequency at A2A2J4 should be within the limits listed in figure 710.
- (4) Remove the frequency counter from the 860E-2.

D. Transmitter Power Output Test.

- (1) Position the DME control on the 578D-1 to ON.
- (2) Channel the 860E-2 to channel 1.
- (3) Set the function switch (13, figure 714B) to the MON/CAL position.
- (4) Condition the oscilloscope for free-running horizontal sweep operation and connect the oscilloscope vertical input to the BRC 8900B VIDEO OUT connector.
- (5) Adjust the VIDEO NULL control (14, figure 714B) until the two horizontal lines, observed on the oscilloscope, are superimposed. Do not change VIDEO NULL control adjustment in subsequent steps.
- (6) Set the function switch (13) to the MEAS position.
- (7) Adjust the COURSE control (12) and the FINE control (11) until the horizontal line, on the oscilloscope, coincides with the peak of the pulse displayed.
- (8) Read the peak RF power on the BRC 8900B PEAK POWER CALIBRATOR meter. The peak RF power should be 29 dbw or more (-1 DB on the meter represents 29 dbw).

NOTE: 0DB on the BRC 8900B PEAK POWER CALIBRATOR meter represents 30 dbw of measured RF power when the 30 db attenuator is connected to the RF IN connector.

- (9) Repeat steps (7) and (8) for the channels listed in figure 710.
- (10) Position the DME control on the 578D-1 to STBY.
- (11) Remove transistor A5Q17 from distance interrogation generator board A5. Road map location is A1.
- (12) Position the DME control on the 578D-1 to ON.



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- (13) Channel the 860E-2 to channel 1.
- (14) Measure the peak power output. It should not be more than 0.2 db below the power output obtained in step (8).
- (15) Position the DME control on the 578D-1 to STBY.
- (16) Replace transistor A5Q17.
- (17) Remove the drive which goes from frequency multiplier amplifier subassembly A2A2 to the power amplifier, by disconnecting A2A2J3.
- (18) Set the DME control on the 578D-1 to ON, and check that there is no power output from the 860E-2 on the channels listed in figure 710.
- (19) Set the DME control on the 578D-1 to STBY.

E. Transmitter Pulse Characteristics.

- (1) Disconnect the 578D-1 lead (figure 714A) from the BRC 13505A MONITOR XMTR connector.
- (2) Move the oscilloscope lead from the BRC 8900B VIDEO OUT connector to the BRC 13505A MONITOR XMTR connector.
- (3) Load the oscilloscope vertical input with a 150-ohm terminating resistor.
- (4) Channel the 860E-2 to channel 1.
- (5) Set the DME control switch on the 578D-1 to ON.
- (6) Measure the rise time from the 10- to 90-percent voltage points on the leading edge of the first and second transmit pulses. The rise time should not be more than 3 usec.
- (7) Measure the fall time from the 90- to 10-percent voltage points on the first and second transmit pulses. The fall time should not be more than 3 usec.
- (8) Measure the pulse width of the first and second transmit pulses at the 50-percent voltage points. The pulse width should be 3.5 ± 0.5 usec.
- (9) Check that the tops of the first and second pulses are round and smooth.
- (10) Repeat steps (5) through (9) for channels 64 and 126.

F. Pulse Code Spacing.

- (1) Using the test setup in paragraph 3.A.E. above, channel the 860E-2 to channel 1.



- (2) Measure the time between the 50-percent voltage point on the leading edge of the first pulse and the 50-percent voltage point on the leading edge of the second pulse. The time should be 12.0 ± 0.2 usec.
- (3) Repeat step (2) for channels 63 and 126.

G. Receiver Sensitivity and Search Speed Test.

- (1) Disconnect oscilloscope from the BRC 13505A MONITOR XMTR connector and connect the 578D-1 lead (disconnected in step 1, paragraph 3.A.E.) to the BRC 13505A MONITOR XMTR connector.
- (2) Set the DME control on the 578D-1 to ON.
- (3) Remove the 150-ohm termination resistor from the oscilloscope vertical input and connect the oscilloscope to A2A6J5 with external sync connected to the 578D-1 (sync selector on squitter).
- (4) Channel the 860E-2 to channel 1, and adjust the output of the HP HOI 8614A to 962 mc at a level below agc threshold.
- (5) Connect the headphones to the IDENT OUTPUT jack on the 578D-1.
- (6) Adjust A2A6C4 to obtain maximum pulse voltage and minimum noise at A2A6J5 as viewed on the oscilloscope.
- (7) Adjust the signal level of the HP HOI 8614A to -92 dbm.
- (8) Measure distance lock-on sensitivity for channels 1, 12, 23, 34, 45, 56, 67, 78, 89, 100, 112, and 126. The distance lock-on sensitivity is the minimum signal level required for the 860E-2 to lock on in four out of five trials.
- (9) On the channel having the lowest distance lock-on sensitivity, adjust i-f gain control A3R74 to obtain -92-dbm sensitivity.
- (10) On the same channel as used in step (9), decrease the signal level into the 860E-2 until a minimum audible tone is heard in the headphones. The signal level should be not more than -93 dbm.

NOTE: The loss due to the directional coupler and coaxial cables must be considered in measuring receiver sensitivity.

- (11) Set the DISTANCE-MI control on the 578D-1 to RANGE A, and adjust the SPEED control to establish an outbound reply at 2000 knots.
- (12) On the same channel used in step (9), determine that the signal level required for distance lock-on is not more than -91 dbm.
- (13) Repeat step (12) for an inbound signal at 2000 knots.



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- (14) On the same channel used in step (10), set the signal level of the HP HOI 8614A to -90 dbm. Remove the reply pulses by disconnecting the INTER INPUT to the 578D-1. Measure the time required for five full search cycles. This time should be less than 80 seconds.

H. AGC Action Test.

- (1) Connect the 860E-2 in the test setup as shown in figure 714A.
- (2) Set controls on the 578D-1 as follows:

DISTANCE-MI - 0

DME - STBY

SEARCH LIMIT - NORMAL

CHANNEL - 33

Power Control - OPERATE
- (3) Connect the oscilloscope to A2A6J5.
- (4) Adjust the signal level of the HP HOI 8614A to -90 dbm.
- (5) Adjust the frequency of the HP HOI 8614A to obtain maximum video pulse amplitude at A2A6J5 as viewed on the oscilloscope.
- (6) Set the PULSE SPACING-USEC control on the 578D-1 to 6.
- (7) Adjust the signal level output of the HP HOI 8614A to -20 dbm.
- (8) Connect the Triplett 630A to A2A6J4. The voltage should be the no-signal value.
- (9) Set the PULSE SPACING-USEC control on the 578D-1 to 11.5. The agc voltage at A2A6J4 should increase to -8.5 ± 1 volts d-c.
- (10) Set the PULSE SPACING-USEC control on the 578D-1 to 16. The agc voltage at A2A6J4 should be the same as in step (8).
- (11) Set the PULSE SPACING-USEC control on the 578D-1 to 12.5. The agc voltage at A2A6J4 should be the same as in step (9).

I. Receiver Decoder Selectivity Test.

- (1) Channel the 860E-2 to channel 10, and adjust the frequency of the HP HOI 8614A to 1188 mc.



- (2) Measure the time between the 50-percent voltage point on the leading edge of the first pulse and the 50-percent voltage point on the leading edge of the second pulse. The time should be 12.0 ± 0.1 usec.
- (3) Repeat step (2) for channels 63 and 126.

G. Receiver Sensitivity and Search Speed Test.

- (1) Disconnect oscilloscope from the BRC 13505A MONITOR XMTR connector and connect the 578D-1 lead (disconnected in step 1, paragraph 3.A.E.) to the BRC 13505A MONITOR XMTR connector.
- (2) Set the DME control on the 578D-1 to ON.
- (3) Remove the 150-ohm termination resistor from the oscilloscope vertical input and connect the oscilloscope to A2A6J5 with external sync connected to the 578D-1 (sync selector on squitter).
- (4) Channel the 860E-2 to channel 1, and adjust the output of the HP HOI 8614A to 962 mc at a level below agc threshold.
- (5) Connect the headphones to the IDENT OUTPUT jack on the 578D-1.
- (6) Adjust A2A6C4 to obtain maximum pulse voltage and minimum noise at A2A6J5 as viewed on the oscilloscope.
- (7) Adjust the signal level of the HP HOI 8614A to -92 dbm.
- (8) Measure distance lock-on sensitivity for channels 1, 12, 23, 34, 45, 56, 67, 78, 89, 100, 112, and 126. The distance lock-on sensitivity is the minimum signal level required for the 860E-2 to lock on in four out of five trials.
- (9) On the channel having the lowest distance lock-on sensitivity, adjust i-f gain control A3R74 to obtain -92-dbm sensitivity.
- (10) On the same channel as used in step (9), decrease the signal level into the 860E-2 until a minimum audible tone is heard in the headphones. The signal level should be not more than -93 dbm.

NOTE: The loss due to the directional coupler and coaxial cables must be considered in measuring receiver sensitivity.

- (11) Set the DISTANCE-MI control on the 578D-1 to RANGE A, and adjust the SPEED control to establish an outbound reply at 2000 knots.
- (12) On the same channel used in step (9), determine that the signal level required for distance lock-on is not more than -91 dbm.
- (13) Repeat step (12) for an inbound signal at 2000 knots.



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- (14) On the same channel used in step (10), set the signal level of the HP HOI 8614A to -90 dbm. Remove the reply pulses by disconnecting the INTER INPUT to the 578D-1. Measure the time required for five full search cycles. This time should be less than 80 seconds.

H. AGC Action Test.

- (1) Connect the 860E-2 in the test setup as shown in figure 714A.
- (2) Set controls on the 578D-1 as follows:

DISTANCE-MI - 0

DME - STBY

SEARCH LIMIT - NORMAL

CHANNEL - 33

Power Control - OPERATE
- (3) Connect the oscilloscope to A2A6J5.
- (4) Adjust the signal level of the HP HOI 8614A to -90 dbm.
- (5) Adjust the frequency of the HP HOI 8614A to obtain maximum video pulse amplitude at A2A6J5 as viewed on the oscilloscope.
- (6) Set the PULSE SPACING-USEC control on the 578D-1 to 6.
- (7) Adjust the signal level output of the HP HOI 8614A to -20 dbm.
- (8) Connect the Triplet 630A to A2A6J4. The voltage should be the no-signal value.
- (9) Set the PULSE SPACING-USEC control on the 578D-1 to 11.5. The agc voltage at A2A6J4 should increase to -8.5 ± 1 volts d-c.
- (10) Set the PULSE SPACING-USEC control on the 578D-1 to 16. The agc voltage at A2A6J4 should be the same as in step (8).
- (11) Set the PULSE SPACING-USEC control on the 578D-1 to 12.5. The agc voltage at A2A6J4 should be the same as in step (9).

I. Receiver Decoder Selectivity Test.

- (1) Channel the 860E-2 to channel 10, and adjust the frequency of the HP HOI 8614A to 1188 mc.



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- (2) With the PULSE SPACING-USEC control on the 578D-1 set to 11.5, 12, and 12.5 respectively, measure distance lock-on sensitivity and minimum audible tone sensitivity. The sensitivities should be the same for all three spacings.
- (3) Set the PULSE SPACING-USEC control on the 578D-1 to 8. There should be no tone output or distance lock-on with an input level of -20, -35, -48, -70, and -90 dbm from the HP HOI 8614A. Also check that the agc voltage falls to the no-signal value.
- (4) Repeat step (3) above with the PULSE SPACING-USEC control on the 578D-1 set to 16.
- (5) Disconnect one end of A3C10.
- (6) Set the PULSE SPACING-USEC control on the 578D-1 to 12.
- (7) Connect the oscilloscope to A3J7.
- (8) Increase the level from the HP HOI 8614A until reply pulses are first observed at A3J7. This level should be 10 to 20 db above minimum distance lock-on sensitivity.

NOTE: Pulses at A3J7 are only present momentarily.

- (9) Reconnect A3C10.

J. Interrogation Pulse Repetition Rate Test.

- (1) Connect a frequency counter to the SUPP jack on the front panel of the 860E-2.
- (2) Operate the 860E-2 in search, and measure the prf using a 10-second average. The search prf should be 146 ± 2 pps.
- (3) Operate the 860E-2 in track, and measure the prf using a 10-second average. The track prf should be 21 ± 1 pps.
- (4) Disconnect the frequency counter from the SUPP jack, and connect the oscilloscope. The pulse spacing should not be constant during search or track.

K. Distance Accuracy Test.

- (1) Adjust the signal level of the HP HOI 8614A to -70 dbm at 972 mc, channel 11.
- (2) Channel the 860E-2 to channel 11 in the search mode.
- (3) Connect the oscilloscope to A4J8 with the vertical sensitivity set to 0.5 volt/cm.
- (4) Adjust A4R44 to obtain minimum amplitude variation of the observed sine wave.

NOTE: The 578D-1 must be calibrated for distance accuracy, and a calibration chart must be used for the following adjustments.



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- (5) Set the DISTANCE-MI control in the 578D-1 to 0.
- (6) Adjust A4R11 in the distance time base generator board so the distance indication on the 578D-1 is 0 mile.
- (7) Connect the frequency counter to A4J3, and measure the frequency of the 4045.6-cps timing oscillator. The frequency should be 4045.6 ± 1 cps.
- (8) Remove the frequency counter from the 860E-2.
- (9) Channel the 860E-2 to channel 17.
- (10) Adjust the frequency of the HP HOI 8614A to 978 mc.
- (11) Increase the output signal level of the HP HOI 8614A to 1 db above minimum distance lock-on level.
- (12) Set the DISTANCE-MI control on the 578D-1 to 0. After the 860E-2 locks on and the 578D-1 FLAG light has been on for 5 seconds, determine the distance error. The error should be within ± 0.1 mile.
- (13) Repeat step (12) for the other fixed ranges on the 578D-1. The error for the ranges should be within ± 0.2 mile.
- (14) Increase the output signal level of the HP HOI 8614A to -80 dbm.
- (15) Repeat step (12) for all fixed ranges on the 578D-1. The error for the 0-, 18-, and 36-mile ranges should be within ± 0.1 mile. The error for the other ranges should be within ± 0.15 mile.
- (16) Increase the output signal level of the HP HOI 8614A to -20 dbm.
- (17) Repeat step (12) for all fixed ranges on the 578D-1. The error for the 0-, 18-, and 36-mile ranges should be within ± 0.1 mile, and the error for the other ranges should be within ± 0.15 mile.
- (18) Adjust the output level of the HP HOI 8614A to -80 dbm.
- (19) Set the SQUITTER RATE control on the 578D-1 to SUPPR.
- (20) Connect the oscilloscope to A6J4 with the 578D-1 SYNC SELECTOR set to REPLY.
- (21) Set the DISTANCE-MI control to 90.
- (22) After the 860E-2 has locked on, observe the position of the 50-percent voltage point on the leading edge of the range gate at A6J4.
- (23) Set the DISTANCE-MI control on the 578D-1 to RANGE A.



- (24) Adjust the SPEED control on the 578D-1 to obtain an inbound signal at approximately 2000 knots. After the 860E-2 has tracked the inbound signal for 15 seconds, observe the maximum excursion of the 50-percent voltage point on the range gate from the location observed in step (22). It should be not more than 0.6 usec.
- (25) Repeat step (24) using a 2000-knot outbound signal.

L. Search Mode Test.

- (1) Connect the oscilloscope to test point A2A3J4. Set the oscilloscope to internal sync.
- (2) Adjust the output of the HP HOI 8614A to a level below minimum lock-on.
- (3) Channel the 860E-2 to channel 31, and set the 578D-1 DME control to ON.
- (4) Check the type of 860E-2 under test. The response of the 860E-2 types are listed in figure 711.
- (5) Repeat steps (3) and (4) for channels 17, 28, 40, 56, and 57. The correct response is listed in figure 711.
- (6) Set the SEARCH LIMIT control on the 578D-1 to OVERRIDE.
- (7) Repeat steps (3), (4), and (5). The correct response is listed in figure 712.
- (8) Channel the 860E-2 to channel 16, and set the SEARCH LIMIT control on the 578D-1 to NORMAL.
- (9) Set the DME control on the 578D-1 to OFF when the distance indication is below 50 miles.
- (10) Set the DME control on the 578D-1 to ON. The distance indicator should be stopped during the 60-second time delay, and when search begins, it should be inbound with no pulses on the oscilloscope.
- (11) Repeat steps (9) and (10) for the following channels: 17 with the 578D-1 SEARCH LIMIT switch set to NORMAL, 17 with the SEARCH LIMIT switch set to OVERRIDE, and 55 with the SEARCH LIMIT switch set to OVERRIDE. The results should be the same as in step (10).
- (12) Channel the 860E-2 to channel 16 with the 578D-1 SEARCH LIMIT switch set to NORMAL.
- (13) Set the DME control on the 578D-1 to STANDBY when the distance indication is greater than 50 miles. The distance indicator should be stopped when the DME control is in STANDBY.
- (14) After the DME control has been in the STANDBY position for 70 seconds, switch the DME control to ON. The initial direction of search should be outbound.



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- (15) Repeat steps (12), (13), and (14) for the channels and conditions listed in figure 713, and check for the listed results.

NOTE: Omit steps (16) and (17) if the 860E-2 under test has TVOR channels permanently overridden.

- (16) Channel the 860E-2 to channel 43 with the 578D-1 SEARCH LIMIT switch in the OVERRIDE position.
- (17) When the distance indication is above 50 miles, switch the SEARCH LIMIT switch to NORMAL. The 860E-2 should immediately begin inbound search.
- (18) Channel the 860E-2 to channel 18 with the 578D-1 SEARCH LIMIT switch set to OVERRIDE.
- (19) Adjust the output of the HP HOI 8614A to -80 dbm at 979 mc.
- (20) Set the DISTANCE-MI control on the 578D-1 to 18 miles.
- (21) After the 860E-2 has locked on, switch the DISTANCE-MI control on the 578D-1 to 0 mile. After the memory period, the 860E-2 should search inbound to slightly less than 0 mile, reverse, and lock on at zero.
- (22) Set the DISTANCE-MI control on the 578D-1 to 18 miles.
- (23) After the 860E-2 has locked on, set the 578D-1 DME control from ON to STANDBY and back to ON. The 860E-2 should immediately slew to slightly less than 0 mile, reverse, and lock on at 18 miles.
- (24) Repeat steps (18) through (23) with the 860E-2 on channel 17 and the HP HOI 8614A set to 978 mc. The results should be the same.
- (25) Repeat steps (18) through (23) with the 860E-2 on channel 1 and the HP HOI 8614A set to 962 mc. The results should be the same.
- (26) With the 860E-2 on channel 1 and the HP HOI 8614A set to 962 mc, set the 578D-1 DISTANCE-MI control to 108 miles.
- (27) Set the 578D-1 DISTANCE-MI control to 126 miles. After the memory period, the 860E-2 should search outbound and lock on at 126 miles.
- (28) With the 578D-1 SEARCH LIMIT control in the OVERRIDE position, repeat steps (26) and (27) with the 860E-2 on channel 27 and the HP HOI 8614A set to 988 mc.
- (29) Set the SQUITTER RATE control on the 578D-1 to SUPPR and set the SEARCH LIMIT switch to OVERRIDE. Channel the 860E-2 to channel 27 and set the HP HOI 8614A to 988 mc.



- (30) Set the DISTANCE-MI control on the 578D-1 to RANGE A, and position the SPEED control slightly to the right of center to provide an outbound reply at about 200 knots. The 860E-2 should track smoothly across the 50-mile range limit switch.
- (31) Set the DISTANCE-MI control on the 578D-1 to 18 miles.
- (32) Channel the 860E-2 to channel 1, and set the HP HOI 88614A to 962 mc.
- (33) After the 860E-2 has locked on, channel the 860E-2 to channel 21. Within one second after channel 21 is reached, the 860E-2 should search inbound.

M. Prememory and Memory Test.

- (1) Channel the 860E-2 to channel 43, and adjust the HP HOI 8614A output to -80 dbm at 1004 mc.
- (2) Set the DISTANCE-MI control on the 578D-1 to 0 mile.
- (3) Set the SQUITTER RATE control on the 578D-1 to IDENT.
- (4) When the 860E-2 is searching, set the 578D-1 SQUITTER RATE control to 2700. Measure the time from the instant the distance indicator stops turning to the time the FLAG light goes on. This time (prememory time) should be not more than 1.5 seconds.
- (5) Set the DISTANCE-MI control on the 578D-1 to RANGE A.
- (6) Adjust the SPEED control on the 578D-1 to obtain an outbound reply signal at about 2000 knots.
- (7) When the 860E-2 is tracking the signal, turn off the HP HOI 8614A output by depressing and releasing the HP HOI 8403A DME switch (16, figure 714B). Measure the time from the moment the output is turned off until the 578D-1 FLAG light goes out (flat time); the time from the moment the output is turned off until the 860E-2 goes into search (memory time); and observe the action of the indicator dials during memory. The 860E-2 response, depending on model and channel, should be as listed in figure 714.
- (8) Turn on the HP HOI 8614A output by depressing the DME switch (16, figure 714B).

N. Self-Test Circuitry Test.

NOTE: The TEST switch on the 860E-2 or the SELF TEST switch on the 578D-1 must be used to provide a ground to P1-21 on the 860E-2. If neither switch is available, an spst switch may be installed on the 578D-1. One side of the switch should be connected to ground, and the other side should be connected to P1-21. In steps that follow, the switch is referred to as the SELF TEST switch.

- (1) Channel the 860E-2 to channel 11, and adjust the output of the HP HOI 8614A to -80 dbm at 972 mc.



- (2) Operate the SELF TEST switch to ground P1-21.
- (3) After the 860E-2 has locked on the self-test signal, adjust A7R79 to obtain a 0-mile indication on the 578D-1.
- (4) Operate the SELF TEST switch to remove ground from P1-21.
- (5) Position the DISTANCE-MI control on the 578D-1 to 18 miles.
- (6) Operate the SELF TEST switch to ground P1-21. The memory time on the 860E-2 should be canceled, and the 860E-2 should slew inbound to less than 0 mile, reverse, and lock on at 0 ± 0.05 mile.
- (7) Operate the SELF TEST switch to remove ground from P1-21. The 860E-2 should lock on at 18 miles after normal memory period.

O. Bearing Output Characteristics Test.

- (1) Channel the 860E-2 to channel 1, and set the 578D-1 SQUITTER RATE control to 2700.
- (2) Adjust the output of the HP HOI 8614A to -85 dbm at 962 mc.
- (3) Connect the oscilloscope to A3J8. The peak amplitude of the signals as measured on the oscilloscope should be not less than 3.0 volts.
- (4) Repeat steps (2) and (3) for HP HOI 8614A output levels of -70 dbm, -40 dbm, and -20 dbm. The peak amplitude should be not less than 3.0 volts with a maximum variation of not more than 20 percent of $\frac{E_{\max} + E_{\min.}}{2}$.

P. Suppression Pulse Characteristics Test.

- (1) Connect a 300-ohm resistor and an 1850-pf capacitor in parallel across the SUPPR jack on the front panel of the 860E-2.
- (2) Connect the oscilloscope across the load.
- (3) Measure the pulse amplitude. It should be 22 to 30 volts positive.
- (4) Measure the pulse width at the 20-volt level. It should be 48 to 53 usec.
- (5) Measure the pulse rise time from 0 to 20 volts. It should be not more than 1 usec.
- (6) Measure the pulse fall time from 20 to 0 volts. It should be not more than 2 usec.
- (7) Measure the pulse drop. It should not be more than 20 percent.



- (30) Set the DISTANCE-MI control on the 578D-1 to RANGE A, and position the SPEED control slightly to the right of center to provide an outbound reply at about 200 knots. The 860E-2 should track smoothly across the 50-mile range limit switch.
- (31) Set the DISTANCE-MI control on the 578D-1 to 18 miles.
- (32) Channel the 860E-2 to channel 1, and set the HP HOI 88614A to 962 mc.
- (33) After the 860E-2 has locked on, channel the 860E-2 to channel 21. Within one second after channel 21 is reached, the 860E-2 should search inbound.

M. Prememory and Memory Test.

- (1) Channel the 860E-2 to channel 43, and adjust the HP HOI 8614A output to -80 dbm at 1004 mc.
- (2) Set the DISTANCE-MI control on the 578D-1 to 0 mile.
- (3) Set the SQUITTER RATE control on the 578D-1 to IDENT.
- (4) When the 860E-2 is searching, set the 578D-1 SQUITTER RATE control to 2700. Measure the time from the instant the distance indicator stops turning to the time the FLAG light goes on. This time (prememory time) should be not more than 1.5 seconds.
- (5) Set the DISTANCE-MI control on the 578D-1 to RANGE A.
- (6) Adjust the SPEED control on the 578D-1 to obtain an outbound reply signal at about 2000 knots.
- (7) When the 860E-2 is tracking the signal, turn off the HP HOI 8614A output by depressing and releasing the HP HOI 8403A DME switch (16, figure 714B). Measure the time from the moment the output is turned off until the 578D-1 FLAG light goes out (flat time); the time from the moment the output is turned off until the 860E-2 goes into search (memory time); and observe the action of the indicator dials during memory. The 860E-2 response, depending on model and channel, should be as listed in figure 714.
- (8) Turn on the HP HOI 8614A output by depressing the DME switch (16, figure 714B).

N. Self-Test Circuitry Test (If Applicable).

NOTE: The TEST switch on the 860E-2 or the SELF TEST switch on the 578D-1 must be used to provide a ground to P1-21 on the 860E-2. If neither switch is available, an spst switch may be installed on the 578D-1. One side of the switch should be connected to ground, and the other side should be connected to P1-21. In steps that follow, the switch is referred to as the SELF TEST switch.

- (1) Channel the 860E-2 to channel 11, and adjust the output of the HP HOI 8614A to -80 dbm at 972 mc.



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- (2) Operate the SELF TEST switch to ground P1-21.
- (3) After the 860E-2 has locked on the self-test signal, adjust A7R79 to obtain a 0-mile indication on the 578D-1.
- (4) Operate the SELF TEST switch to remove ground from P1-21.
- (5) Position the DISTANCE-MI control on the 578D-1 to 18 miles.
- (6) Operate the SELF TEST switch to ground P1-21. The memory time on the 860E-2 should be canceled, and the 860E-2 should slew inbound to less than 0 mile, reverse, and lock on at 0 ± 0.05 mile.
- (7) Operate the SELF TEST switch to remove ground from P1-21. The 860E-2 should lock on at 18 miles after normal memory period.

O. Bearing Output Characteristics Test.

- (1) Channel the 860E-2 to channel 1, and set the 578D-1 SQUITTER RATE control to 2700.
- (2) Adjust the output of the HP HOI 8614A to -85 dbm at 962 mc.
- (3) Connect the oscilloscope to A3J8. The peak amplitude of the signals as measured on the oscilloscope should be not less than 3.0 volts.
- (4) Repeat steps (2) and (3) for HP HOI 8614A output levels of -70 dbm, -40 dbm, and -20 dbm. The peak amplitude should be not less than 3.0 volts with a maximum variation of not more than 20 percent of $\frac{E_{\max} + E_{\min}}{2}$.

P. Suppression Pulse Characteristics Test.

- (1) Connect a 300-ohm resistor and an 1850-pf capacitor in parallel across the SUPPR jack on the front panel of the 860E-2.
- (2) Connect the oscilloscope across the load.
- (3) Measure the pulse amplitude. It should be 22 to 30 volts positive.
- (4) Measure the pulse width at the 20-volt level. It should be 45 to 50 usec.
- (5) Measure the pulse rise time from 0 to 20 volts. It should be not more than 1 usec.
- (6) Measure the pulse fall time from 20 to 0 volts. It should be not more than 2 usec.
- (7) Measure the pulse drop. It should not be more than 20 percent.



Q. Suppression Pulse Input Test.

- (1) Connect the SUPPRESSOR OUTPUT from the 578D-1 to the SUPPR jack on the front of the 860E-2 and to one vertical input of the dual-track oscilloscope. On the other vertical input of the dual-trace oscilloscope, observe the video pulses at test point A3J7.
- (2) Set the 578D-1 SYNC SELECTOR to REPLY.
- (3) Turn the SUPPRESSOR adjust screw on the 578D-1 fully counterclockwise.
- (4) Align the suppression pulses with the video pulses.
- (5) Increase the amplitude of the suppression pulses by turning the SUPPRESSOR adjust screw on the 578D-1 until the video pulses at A3J7 are suppressed. The amplitude of the suppression pulses should be not more than 15 volts.

R. Automatic Standby Test.

- (1) Replace transistor A4Q202 removed in paragraph 3.A.(2).
- (2) Channel the 860E-2 to channel 1.
- (3) Adjust the output of the HP HOI 8614A to -70 dbm at 962 mc.
- (4) Set the 578D-1 SQUITTER RATE control to 700.
- (5) Set the DISTANCE-MI control on the 578D-1 to 198.
- (6) Adjust A4R204 in the counterclockwise direction until the indicator is completely stopped between 0 and 50 miles.
- (7) Slowly adjust A4R204 in the clockwise direction until the indicator is rotating freely without evidence of stopping.
- (8) Set the 578D-1 SQUITTER RATE control to 2700.
- (9) Adjust the output level of the HP HOI 8614A until the 860E-2 just locks on. The output level should be not more than -92 dbm.
- (10) Decrease the output level of the HP HOI 8614A until the indicator stops rotating between 0 and 50 miles. The signal level should be not more than 10 db below the level obtained in step (9).
- (11) Slowly increase the signal level until the indicator rotates freely without evidence of halting. The signal level should be not less than 1 db below the level obtained in step (9).



Q. Suppression Pulse Input Test.

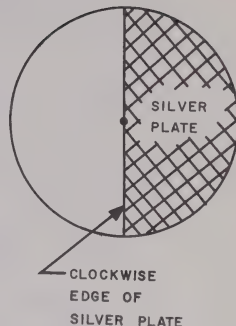
- (1) Connect the SUPPRESSOR OUTPUT from the 578D-1 to the SUPPR jack on the front of the 860E-2 and to one vertical input of the dual-track oscilloscope. On the other vertical input of the dual-trace oscilloscope, observe the video pulses at test point A3J7.
- (2) Set the 578D-1 SYNC SELECTOR to REPLY.
- (3) Turn the SUPPRESSOR adjust screw on the 578D-1 fully counterclockwise.
- (4) Align the suppression pulses with the video pulses.
- (5) Increase the amplitude of the suppression pulses by turning the SUPPRESSOR adjust screw on the 578D-1 until the video pulses at A3J7 are suppressed. The amplitude of the suppression pulses should be not more than 15 volts.

R. Automatic Standby Test.

- (1) Replace transistor A4Q202 removed in paragraph 3.A.A.
- (2) Channel the 860E-2 to channel 1.
- (3) Adjust the output of the HP HOI 8614A to -70 dbm at 1168 mc.
- (4) Set the 578D-1 SQUITTER RATE control to 700.
- (5) Set the DISTANCE-MI control on the 578D-1 to 198.
- (6) Adjust A4R204 in the counterclockwise direction until the indicator is completely stopped between 0 and 50 miles.
- (7) Slowly adjust A4R204 in the clockwise direction until the indicator is rotating freely without evidence of stopping.
- (8) Set the 578D-1 SQUITTER RATE control to 2700.
- (9) Adjust the output level of the HP HOI 8614A until the 860E-2 just locks on. The output level should be not more than -92 dbm.
- (10) Decrease the output level of the HP HOI 8614A until the indicator stops rotating beating between 0 and 50 miles. The signal level should be not more than 10 db below the level obtained in step (9).
- (11) Slowly increase the signal level until the indicator rotates freely without evidence of halting. The signal level should be not less than 1 db below the level obtained in step (9).



- (2) Adjust the frequency of the HP-608D to 63 MHz CW as determined by the 1-MHz calibration control on the signal generator. This adjustment must be maintained throughout the entire if. amplifier alignment procedure.
- (3) Connect the vtvm to A2A6J4.
- (4) Turn the attenuator dial on the HP-608D fully counter-clockwise (maximum attenuation).
- (5) Adjust A3R74 to obtain an indication of -4 volts on the vtvm.
- (6) Connect the vtvm to A2A6J6, and increase the signal level from the HP-608D until an output is observed on the vtvm. Maintain the dc level at A2A6J6 between 0 and +0.3 volt.
- (7) Adjust A2A6C49 to obtain a maximum reading on the vtvm.
- (8) Repeat step (7) for capacitors A2A6C42, C31, C25, C18, C7, and C4.



Trimmer Capacitor,
Top View
Figure 718

NOTE: If A2A2CR1 was removed in paragraph 4.B, it must be replaced now.

G. Preselector Alignment and Crystal Current Adjustment.

CAUTION: WHEN THE 860E-2 IS TURNED OFF, THE TUNING ARM IN THE PRE-SELECTOR SHOULD NEVER BE PULLED MANUALLY TO A HIGH POSITION AND ALLOWED TO SNAP BACK INTO PLACE. THE SHOCK CAUSED WHEN THE TUNING ARM HITS BOTTOM COULD DAMAGE CRYSTAL DIODE A2A5CR1.

WHEN THE 860E-2 IS TURNED ON, THE TUNING ARM IN THE PRE-SELECTOR SHOULD NEVER BE MOVED MANUALLY. THIS COULD TUNE THE RECEIVER TO THE TRANSMIT FREQUENCY AND DAMAGE THE CRYSTAL DIODE.

- (1) Connect the 860E-2 in the manner required by the test equipment you are using.
 - (a) Figure 719 shows the setup for preselector alignment using the HP-612A signal generator.
 - (b) Figure 720 shows the setup using the Boonton 8925A DME/ATC Test Set. Refer to figure 703 for initial setting of controls.
 - (c) Figure 721 shows the setup using the Boonton 235A Navigation Aid Test Set. Set the function selector on the 235A to the PULSE position.



- (2) Position the controls on the 578D-1 as listed below:

SEARCH LIMIT
switch - NORMAL

PULSE SPACING-
USEC switch - 12

SQUITTER RATE
switch - 2700

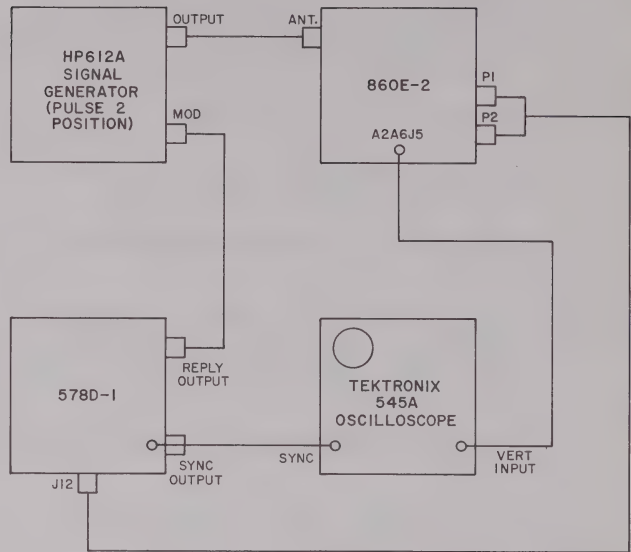
DISTANCE-MI
switch - 0

REPLY EFFI-
CIENCY
switch - NOR-
MAL

SYNC SELECTOR
switch - SQUITTER

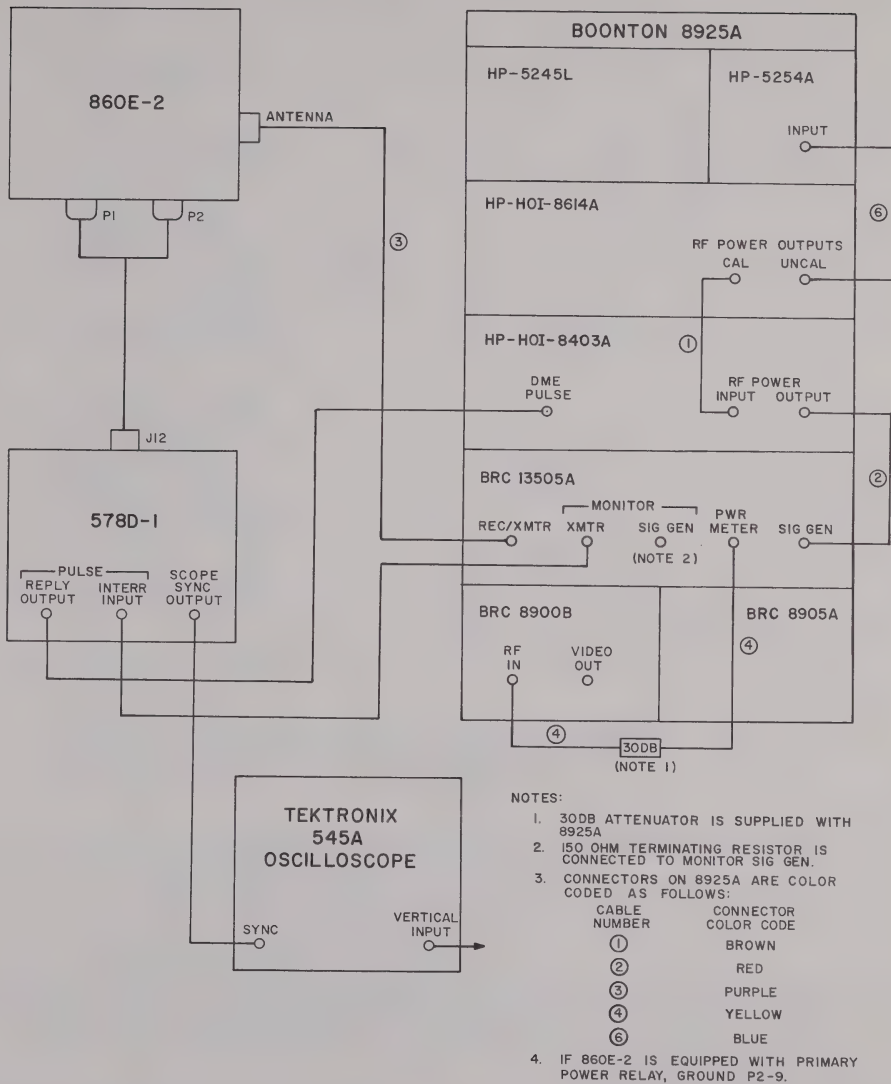
DME control - STBY

CHANNEL selectors - 116

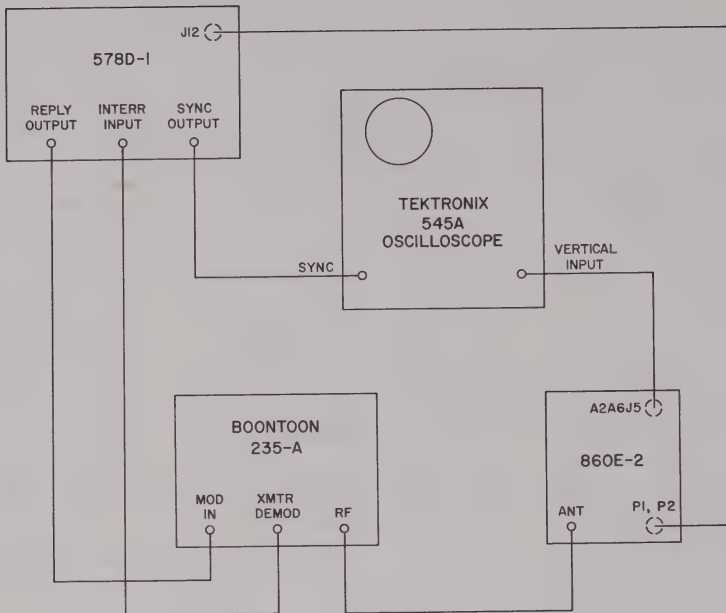


Preselector Alignment Setup Using
the HP-612A Signal Generator
Figure 719

- (3) Connect the vertical input of the oscilloscope to A2A6J5 and the external sync jack on the oscilloscope to the SYNC OUTPUT jack on the 578D-1.
- (4) Adjust the output frequency of the signal generator to approximately 1203 MHz.
- (5) Increase the signal level of the signal generator until a video signal is seen on the oscilloscope.
- (6) Short A2A5Z1 and A2A5Z3.
- (7) Alternately adjust the A2A5Z2 tuning slug and the frequency of the signal generator to obtain maximum signal amplitude on the oscilloscope.
- (8) Remove short from A2A5Z1 and A2A5Z3.
- (9) Short A2A5Z2, and adjust A2A5Z1 tuning slug and frequency of the signal generator to obtain maximum signal amplitude on the oscilloscope.
- (10) Short A2A5Z2, and adjust A2A5Z3 tuning slug and frequency of the signal generator to obtain maximum signal amplitude on the oscilloscope.



Preselector Alignment Setup Using
the Boonton 8925A Test Set
Figure 720



Preselector Alignment Setup Using
the Boonton 235A Test Set
Figure 721

NOTE: The following steps adjust the crystal current.

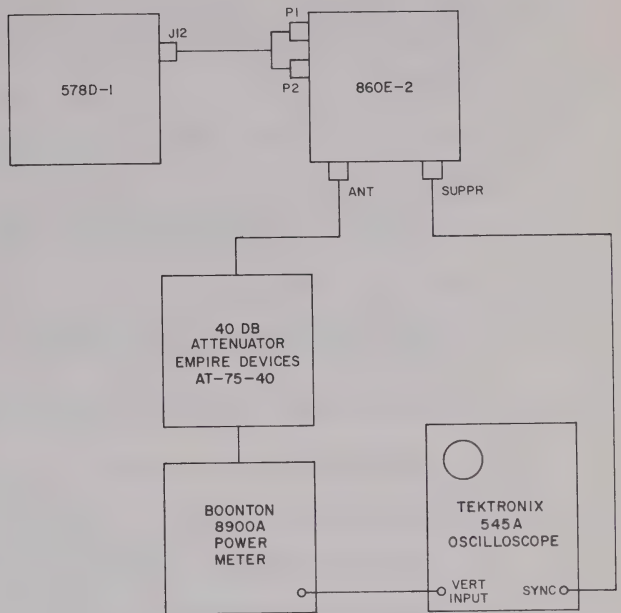
- (11) Connect the 860E-2 in the test setup as shown in figure 712.
- (12) Connect the Triplet 630 vom to A2A6J7 (set to 60-ua scale).
- (13) Check crystal current on each channel as measured at A2A6J7. On the channel with the lowest value of crystal current, adjust A2A5C1 to obtain highest possible current between 15 and 25 ua. See figure 733.

H. Power Amplifier Alignment.

NOTE: Power amplifier alignment must be made with the power amplifiers in the non-saturated condition. This condition may be obtained by placing 10- or 16-db attenuation between the output of frequency multiplier amplifier subassembly A2A2J3 and the input to the power amplifier at A2A3P1.

- (1) Connect the 860E-2 in the test setup as shown in figure 722.
- (2) Position the CHANNEL selector controls to channel 63.

- (3) Position the DME control to ON.
- (4) Connect the oscilloscope to A2A3J2.
- (5) Adjust the trimmer control on A2A3Z1 for a maximum negative voltage reading as viewed on the oscilloscope.
- (6) Connect the oscilloscope to A2A3J3.
- (7) Adjust the trimmer control on A2A3Z2 for maximum negative voltage reading as viewed on the oscilloscope.
- (8) Connect the oscilloscope to A2A3J4.
- (9) Adjust the trimmer control on A2A3Z3 for a maximum negative voltage reading as viewed on the oscilloscope.



NOTE:
IF 860E-2 IS EQUIPPED WITH PRIMARY POWER RELAY, GROUND P2-9

Power Amplifier Alignment Setup
Figure 722

- (10) Adjust the trimmer control on A2A3Z4 for maximum pulse amplitude as indicated on the peak power meter.
- (11) Position the CHANNEL selector controls to channel 01.
- (12) Connect the oscilloscope to A3A3J2.
- (13) Adjust the slope control on A2A3Z1 for a maximum negative voltage as indicated on the oscilloscope.
- (14) Connect the oscilloscope to A2A3J3, and adjust the slope control on A2A3Z2 for a maximum negative voltage.
- (15) Connect the oscilloscope to A2A3J4, and adjust the slope control on A2A3Z3 for a maximum negative voltage.
- (16) Adjust the slope control on A2A3Z4 for a maximum pulse amplitude as indicated on the peak power meter.



(17) Channel the 860E-2 from 1 to 126 in 10-channel steps, and observe the indication on the peak power meter. Repeat the above adjustments on channels showing high or low power output until the power output of the 860E-2 is as constant as possible.

(18) Remove the attenuation between A2A2J3 and A2A3P1.

NOTE: Some adjustments may be required to the trimmer and slope controls of A2A3Z3 and A2A2Z4 after removing the attenuation to optimize the power output across the band as observed on the peak power meter.

(19) Measure the power output levels on all 860E-2 channels.

(20) Disconnect frequency multiplier amplifier A2A2J3 from the power amplifier at A2A3P1. There should be no power output on any channel.

(21) Connect frequency multiplier amplifier to A2A3P1.

I. Distance Mechanism Module Alignment.

(1) 200-Mile Distance Mechanism Module Alignment. (Refer to figure 111.)

(a) Connect the distance mechanism to the 860E-2 using an extender cable.

(b) Preliminary Adjustments.

1. Rotate gears of the top gear train until hundreds indicator dial indicates approximately zero.

2. Face the front gearplate (140), and rotate the units gear (34) clockwise until the Geneva mechanism begins to transfer. The leading edge of the clockwise tooth of the units gear (34) must make contact with a tooth of the transfer pinion (30).

3. Loosen collar (52) beneath units indicator (25), and adjust zero on the indicator to the lubber line on the top retaining plate (21). Maintain reference position zero. Tighten collar (52).

4. Remove indicator dial (80).

(c) Microswitch S1 (38) Adjustment.

1. Adjust switch S1 assembly so roller is 0.025 to 0.030 inch from lower step of cam.

2. Adjust cam gear assembly until S1 is releasing and actuating between 99.2 and 99.8 miles on lower cam. Shift mesh of gear teeth, if necessary, for coarse adjustment. Loosen screws slightly, and shift lower cam on gear for fine adjustment.

3. Rotate gear train, and adjust upper cam so S1 is releasing and actuating between 198.2 and 198.8.



4. Obtain 860E-2 lock-on at 0 mile as indicated on the 578D-1.
 5. Replace dial (80) using retaining ring (78) and flathead screws (79).
- (d) Microswitch S2 (44) Adjustment.
1. Adjust switch S2 assembly so roller is 0.025 to 0.030 inch from lower step.
 2. Adjust lower cam and upper cam so that lower cam is almost ready to lift S2 roller if cam is rotated counterclockwise.
 3. Adjust lower cam so S2 will operate between 199.0 and 199.6 miles. Shift mesh of gear teeth if necessary for coarse adjustment. Loosen screws slightly, and shift lower cam on gear for fine adjustment.
 4. Rotate gear train, and adjust upper cam so S2 is releasing and actuating between 49.5 and 50.5 miles.
- (e) Microswitch S3 Adjustment.
- NOTE: Microswitch S3 is optional and may not be on the 860E-2 under test.
1. Manually rotate the gear train until the switch is actuated. A meter or similar continuity checker connected to the common and normally open terminals of the switch will be helpful.
 2. Set the adjusting screw on the cam follower until the switch remains actuated for 14 ± 0.2 miles. Rotating the gear train at the motor end will give the finest control of the switch actuation.
 3. Rotate the gear train, and determine if the switch operates 12.5 ± 1 miles and 198.4 ± 0.4 miles. Fine adjustments can be made with the cam follower adjustment screw. Coarse adjustment can be made by rotating the cam after loosening the clamp screw. Removal of the coarse distance dial will make this adjustment easier.
- (f) Potentiometer R1 (127) Alignment. (Refer to figure 111.)
1. Loosen the setscrew in clamp (105).
 2. Connect the Triplett 630 vom, set on the X1000 range, between the R1B jacks located on the rear of the 578D-1.
 3. Insert a screwdriver in the slot on the end of the potentiometer (127) shaft. Adjust R1 so that the vom gives a minimum resistance indication at 198.00 ± 0.05 miles as indicated on the hundreds and units dial of the module.
 4. Tighten the clamp (105), and recheck the potentiometer setting.



(g) Potentiometer R2 (138) Alignment. (Refer to figure 111.)

NOTE: Potentiometer R2 is optional and may not be on the 860E-2 under test.

1. Lock gear train at 0 mile.
2. Loosen the setscrew (98) in clamp (97).
3. Connect the Triplet 630 vom between the R2 jacks on the rear of the 578D-1.
4. Insert a screwdriver in the slot on the end of the potentiometer (138) shaft. Adjust R2 for minimum resistance at 0.00 ± 0.5 mile.
5. Tighten the clamp (97), and recheck the potentiometer setting.
6. Unlock gear train.

(h) Resolver B1 Alignment.

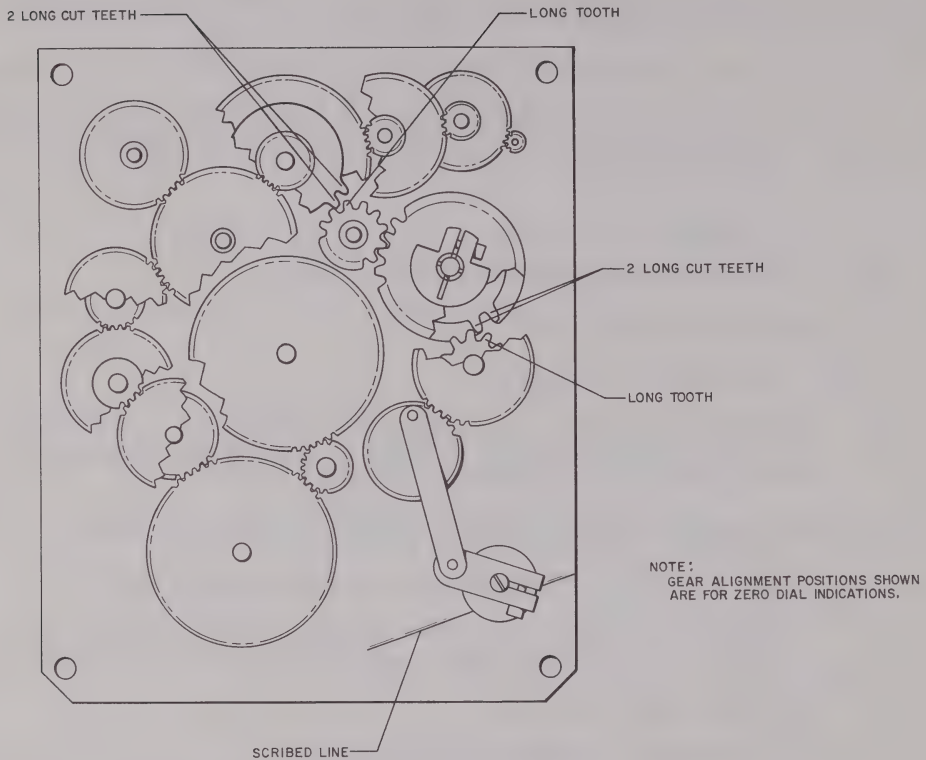
1. Remove the distance mechanism module from the 860E-2 chassis.
2. Fabricate the test fixture shown in figure 1006, and connect it to the test equipment and to the distance mechanism module as shown.
3. Adjust the input to pins 9 and 10 of the distance mechanism module to 9 ± 0.5 volt rms.
4. Set the distance-indicating dials (80, 25) to exactly 1 mile, and lock gears.
5. Loosen screw (65) on the resolver gear (66).
6. Hold the gear train of the distance mechanism module stationary, and using a screwdriver, adjust the resolver (124) shaft for a null on the Ballantine 310A vtm connected to the test fixture.
7. Adjust the BALANCE potentiometer of the test fixture for a null on the 310A (less than 3 millivolts).
8. Repeat steps 6 and 7 until no further improvement can be made.
9. Tighten screw (65) in gear clamp (64).
10. Carefully recheck the null to ensure it is at exactly 1 mile.

(i) Units Synchro B2 Alignment.

1. Install the distance mechanism in the 860E-2, and set the 578D-1 DME OFF/STBY/ON switch to STBY.



2. Ensure that the gears (30, 34) between the units and tens synchros (149, 150 respectively) are still locked as in step 4 of the preceding paragraph.
 3. Loosen setscrew (33) in gear clamp (32) on the units synchro (149) shaft.
 4. Using a screwdriver inserted in the end of the shaft, adjust the units synchro (149) for a 1-mile indication on the 578D-1 DISTANCE-MI indicator.
 5. Tighten gear clamp (32).
 6. Recheck the alignment of units synchro, B2.
 7. Unlock the gear train.
- (j) Tens Synchro B3 Alignment.
1. Ensure the distance mechanism module is installed in the 860E-2, the 578D-1 DME OFF/STBY/ON switch is in the STBY position, and gears (55, 30) have just completed the transfer at 1 mile.
 2. Loosen setscrew (28) in gear clamp (27) on the tens synchro (150) shaft.
 3. Set the distance-indicating dials (80, 25) to exactly 10 miles.
 4. Using a screwdriver inserted in the end of the shaft, adjust tens synchro (150) for a 10-mile indication on the 578D-1 DISTANCE-MI indicator.
 5. Tighten gear clamp (27).
 6. Recheck the alignment of tens synchro B3.
- (2) 200/300-Mile Distance Mechanism Module Alignment. (Refer to figures 111A, 723, and 724.)
- (a) Preliminary Mechanical Alignment (Normally Made During Assembly) To Synchronize Geneva Transfer Dials and Hundreds Synchro Linkage.
1. Facing the gear side of plate (151), hold transfer pinion on gear (82) (long teeth in full engagement with outside diameter of locking disc (91)). Maintain this position through step 6.
 2. Rotate gear assembly (89) cw until the leading edge of gear (93) makes contact with a tooth of the transfer pinion on gear (82). Maintain this position through step 6.
 3. Assemble gear (44).
 4. Rotate gear assembly (46) cw until the leading edge of gear sector (49) makes contact with the transfer gear (44). Maintain this position through step 6.



300-Mile Distance Mechanism
Module, Gear Train Alignment Diagram
Figure 723

5. Assemble gearplate (31).
6. Assemble dials (21, 24) with 0 mark on each aligned with lubber line on plate (31).
7. Rotate mechanism to 150 ± 30 miles.
8. Align edge of arm assembly (29) with engraved line on gearplate (151).
9. Assemble link (27) to pin in arm assembly (29) and pin in gear (79) (disengaged from mating gear (82)). This may be done in two different link positions; however, the correct position is the one having the largest included angle between arm assembly (29) and link (27).



10. With arm (29) still aligned with engraved line on plate (151), find the closest mesh between gear (79) and gear (82).

11. Connect the 200/300-mile distance mechanism module to the 860E-2 using an extender cable.

(b) Units Synchro B2 (139) Alignment.

1. Ensure the distance mechanism module is connected to 860E-2 by means of adapter cable and the 578D-1 DME OFF/STBY/ON switch is on STBY position.

2. Rotate gear train so that units dial (24) indicates exactly 1 mile. Lock gear train.

3. Loosen screw (42) on clamp (41) on the units synchro (139) shaft.

4. Using a screwdriver inserted in end of shaft, adjust the units synchro (139) for a 1-mile indication of 578D-1 DISTANCE-MI indicator.

5. Tighten screw (42).

6. Recheck the alignment of the units synchro (139).

7. Unlock the gear train.

(c) Tens Synchro B3 (122) Alignment.

1. Ensure the distance mechanism module is connected to 860E-2 by means of adapter cable, the 578D-1 DME OFF/STBY/ON switch is on STBY position, and gears (46, 44) have just completed the transfer at 1 mile.

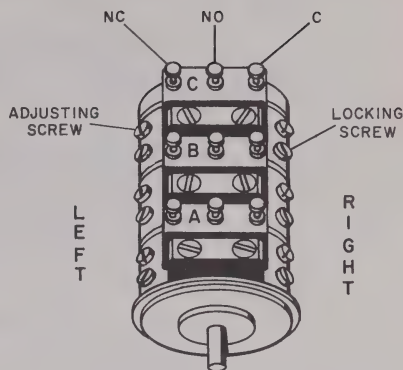
2. Rotate gear train so that distance-indicating dials (21, 24) read exactly 10 miles.

3. Loosen screw (90) on clamp (88) on tens synchro (122) shaft.

4. Using a screwdriver inserted in end of synchro (122) shaft, adjust synchro (122) for a 10-mile indication on 578D-1 DISTANCE-MI indicator.

5. Tighten screw (90) on clamp (88).

6. Recheck alignment of tens synchro (122).



Pictorial Diagram of
the Cam Switch
Figure 724



(d) Hundreds Synchro B4 (106) Alignment.

1. Ensure the distance mechanism module is connected to 860E-2 by means of adapter cable and the 578D-1 DME OFF/STBY/ON switch is on STBY position.
2. Rotate gear train so that distance-indicating dials (21, 24) read exactly 100 miles. If hundreds linkage has been aligned properly, arm (29) should have just completed the transfer placing the arms edge parallel with the engraved line on gearplate (151).
3. Loosen screw (30) on arm (29) on hundreds synchro (106) shaft.
4. Using a screwdriver inserted in end of synchro (106) shaft, adjust synchro (106) for a 100-mile indication on 578D-1 DISTANCE-MI indicator.
5. Tighten screw (30) on arm (29).
6. Recheck alignment of hundreds synchro (106).

(e) Potentiometer R1 (114) Alignment.

1. Connect Triplet 630 vom, set on X1000 range, between R1B jacks on rear of 578D-1.
2. Rotate gear train, in increasing-miles direction, to indicate a distance of 198.4 ± 0.10 miles for 200-mile range or 297.6 ± 0.15 miles for 300-mile range.
3. Loosen screw (77) on clamp (76). Using a screwdriver in end of potentiometer (114) shaft, adjust potentiometer (114) so that the vom gives a minimum resistance indication.
4. Tighten screw (77), and recheck the adjustment by rotating gear train in vicinity of dial indication in step 2 above.

(f) Potentiometer R3 (135) Alignment.

NOTE: Potentiometer is optional and may be present on the module in the form of a dummy housing.

1. Lock gear train at 0 mile.
2. Loosen screw (60) in clamp (59).
3. Connect Triplet 630 vom between the R2 jacks on rear of 578D-1.
4. Insert a screwdriver in the end of potentiometer (135) shaft and adjust for minimum resistance at 100 ± 0.05 miles.
5. Tighten screw (60), and recheck potentiometer adjustment.



6. Unlock gear train.
- (g) Distance Resolver B1 (140) Alignment.
1. Fabricate the test fixture shown in figure 1006, and connect it to test equipment and distance mechanism as shown.
 2. Adjust the input to pins 9 and 10 of the distance mechanism module to exactly 9 volts rms.
 3. Rotate gear train so that distance-indicating dials (24, 21) read exactly 1 mile, and lock gears.
 4. Loosen screw (57) on clamp (56).
 5. Adjust resolver (140) shaft for a null on Ballantine 310A vtvm connected to test fixture.
 6. Adjust BALANCE potentiometer of test fixture for a null on 310A (less than 3 mv.)
 7. Repeat steps 5 and 6 until no further improvement can be made.
 8. Tighten screw (57) in clamp (56).
 9. Carefully check the null to ensure it is at exactly 1 mile.
- (h) Cam Switch S1 (110) Alignment General Instructions for Cam Switch Adjustment. (Refer to figures 111A and 724.)
1. The cam switch assembly has approximately 182 degrees of cam adjustment. The switches are activated when the cam follower is within the operating angle. The use of a single-pole, double-throw switch allows the choice of using the complementary angle of any settings less than 180 degrees by choosing the proper pole for desired operation.
 2. The choice of the normally open or normally closed terminal is governed by 2 factors: (a) operating angle is less than or greater than 180 degrees, and (b) circuit is open or closed within the operating angle.
 3. The cams have mechanical stops to provide "feel" for maximum or minimum position of the adjustment range. Care must be used to avoid forcing at the stop positions.
 4. When making adjustments, the locking screw for the adjusting pinions should be loosened only enough to allow the pinion to turn. Too much loosening will allow the pinion to back out of its mounting hole and cause improper mesh with cam gear.
- (i) Zero-end settings require the same physical position for both 200- and 300-mile range assemblies. The physical location of upper limit settings is



affected by the scale factor. The cam switch assembly makes 1 full revolution for full range in both 200- and 300-mile configurations.

1. Switch A.

- a. Attach indicating device in series with switch, and connect to terminals shown in figure 724. Rotate gear train to approximately -2.8 miles (200-mile range) or -4.1 (300-mile range) relative to 0 mile and lock.
- b. Loosen screw (99) in gear clamp (98) on cam switch (110) and gear (97). Rotate shaft until switch breaks or shows open circuit condition; then looking at shaft end, slowly rotate ccw until switch makes. Tighten gear clamp.
- c. Looking at shaft end and down on switch terminals, loosen locking screw on left-hand adjusting pinion. (See steps 3 and 4 of general instructions in paragraph 4.I.(2)(h) above.) Turn pinion ccw until switch breaks (open circuit), and then turn slowly cw until switch makes. Tighten locking screw. Rotate gear forward and reverse, noting make-break points (differential). Switch should make at approximately -3.3 miles and break at approximately -1.1 miles for the 200-mile range. Switch should make at -5.4 miles and break at -1.7 miles for 300-mile range. This results in a mean of 2.2 miles (200-mile range) or 3.4 miles (300-mile range). Readjust as necessary to achieve mean reading of -2.2 miles or -3.4 miles dependent on distance mechanism range.
- d. Rotate gear train to 50 miles and lock. Loosen locking screw on right-hand adjusting pinion. If switch shows closed circuit condition, rotate adjusting pinion cw until switch breaks, and then turn slowly ccw until switch makes. Tighten locking screw. Readjust as necessary to achieve mean reading of 50 miles.

2. Switch B.

NOTE: This switch section is applicable for 300-mile range only.

- a. Attach indicating device, as in paragraph 4.I.(2)(i)1.a above, to switch B, and rotate gear train to -7.5 miles relative to 0 mile and lock. Loosen locking screw on right-hand adjusting pinion. If circuit is open, turn adjusting pinion ccw until switch makes, and then turn slowly cw until switch breaks. Tighten locking screw. Rotate forward and reverse, noting make-break points. Readjust as necessary to achieve a mean reading of -5.8 miles.
- b. Rotate gear train to 199 miles and lock. Loosen locking screw on left-hand adjusting pinion. If circuit is open, turn adjusting pinion cw until switch makes, then turn slowly ccw until switch breaks. Tighten locking screw. Readjust as necessary to achieve a mean reading of 197.5 miles.

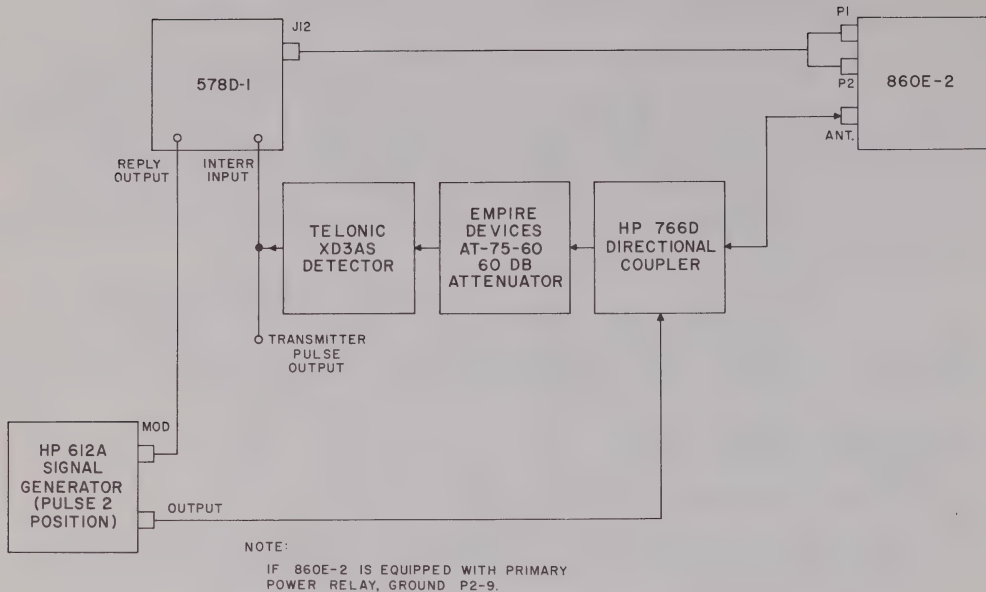


3. Switch C.

- a. Attach indicating device, as in paragraph 4.I.(2)(i)1.a above, to switch C, and rotate gear train to -5 miles for 200-mile range (-7.5 miles for 300 mile-range) relative to zero mile on cam switch shaft. Loosen locking screw on left-hand adjusting pinion. If circuit is closed, turn adjusting pinion cw until switch breaks, then turn slowly ccw until switch makes. Tighten locking screw. Readjust as necessary to achieve mean reading of -3.9 miles (200-mile range) or -5.8 miles (300-mile range).
- b. Rotate gear train to 14 miles and lock. Loosen locking screw on right-hand adjusting pinion. If circuit is closed, turn adjusting pinion ccw until switch breaks, then turn slowly cw until switch makes. Tighten locking screw. Readjust as needed to achieve mean reading of 12.5 miles.

J. Distance Circuits Alignment.

- (1) Connect the equipment in the proper setup.
 - (a) Figure 725 shows the setup using the HP-612A signal generator. Connect the oscilloscope to the point marked "Transmitter Pulse Output" on the diagram.
 - (b) Figure 726 shows the equipment setup using the Boonton 8925A test set. Connect the oscilloscope vertical input to MONITOR XMTR on the BRC 13505A. (Refer to Figure 703 for switch settings on Boonton 8925A test set.)
 - (c) Figure 727 shows the equipment setup using the Boonton 235A test set. Connect the oscilloscope vertical input to XMTR DEMOD jack on the 235A.
- (2) Set the DME control on the 578D-1 to ON.
- (3) Set the CHANNEL selectors on the 578D-1 to 63.
- (4) Set oscilloscope sweep time to 2 us/cm; adjust A4R28 to obtain a pulse spacing of 12 us between the 50-percent voltage points on the leading edge of each pulse.
- (5) Remove transistor A5Q17 from the 860E-2.
- (6) Connect the counter to the SUPPRESSOR OUTPUT jack.
- (7) Adjust A5R78 to obtain 21 pps as measured on the counter.
- (8) Replace transistor A5Q17.
- (9) Adjust A5R83 to obtain 146 pps as measured on the counter when the 860E-2 is in search.
- (10) Disconnect the counter.



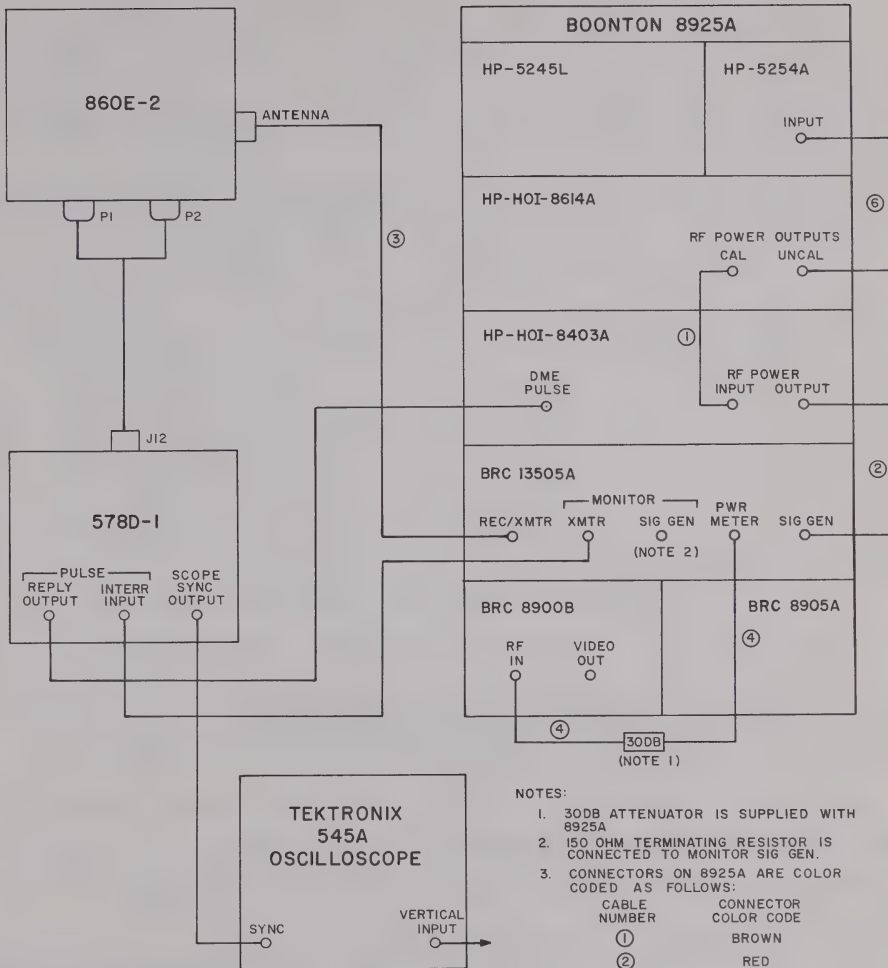
Distance Circuits Alignment Setup
Using the HP-612A Signal Generator
Figure 725

- (11) Connect the oscilloscope to A5J5.
- (12) Adjust A5R14 to obtain a linear ramp voltage of 3.8 milliseconds duration.
NOTE: This is a critical adjustment and should be repeated until the minimum error is obtained in step (14).
- (13) Connect the oscilloscope to A5J7.
- (14) With 860E-2 in search condition, observe that the coincidence pulse in the 200-us gate remains in the center of the gate, ± 25 us, beyond 10 miles of the search cycle of the 860E-2. If the pulse deviates more than ± 25 us, repeat steps (11) and (12).

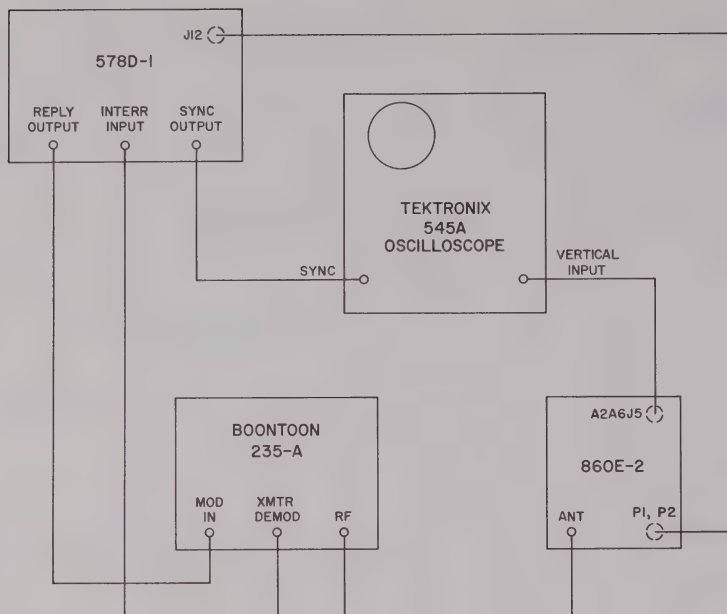
NOTE: For adjustment of distance resolver phasing A4R44 and distance zero A4R11, refer to paragraph 3.K.

K. Distance Decoder Adjustment.

- (1) Connect the equipment as in paragraph 4.J.



Distance Circuits Alignment Setup
Using the Boonton 8925A Test Set
Figure 726



Distance Circuits Alignment Setup
Using the Boonton 235A Test Set
Figure 727

- (2) Set the SQUITTER RATE switch on the 578D-1 to 2700.
- (3) Set the CHANNEL selectors on the 578D-1 to 11.
- (4) Set the DME control on the 578D-1 to ON.
- (5) Adjust the signal generator to 972 MHz at -86 dbm.
- (6) Connect the oscilloscope to A3J4, and position the SYNC SELECTOR on the 578D-1 to SQUITTER. Connect the external sync jack on the oscilloscope to the SYNC OUTPUT jack on the 578D-1.
- (7) Adjust A3R16 to obtain a pulse width of 4 us on the first pulse of the pulse pair.
- (8) Observe the location of the coincident pulse on the 4-us gate with respect to the leading edge of the gate. It should be 2 ± 1 us behind the leading edge.
- (9) Adjust the signal level from the signal generator to -70 dbm.



(10) Connect the oscilloscope to A2A6J5.

(11) Adjust A3R63 to obtain a pulse amplitude of 1.5 volts as viewed on the oscilloscope.

NOTE: When receiver sensitivity control A3R74 is changed, repeat steps (9), (10), and (11).

(12) Adjust the signal level from the signal generator to -20 dbm. The pulse at A2A6J5, as viewed on the oscilloscope, should be not more than 1.6 volts.

(13) Connect a 200-ohm load to the IDENT OUTPUT jack on the 578D-1.

(14) Connect the true rms reading voltmeter across the 200-ohm load of step (13); or connect a 0- to 50-ma thermocouple ammeter in series with the 200-ohm load of step (13).

(15) Connect the dc vtm to A3J10.

(16) Adjust A3R92 fully clockwise.

(17) Adjust A3R89 to obtain at least +6 volts dc at A3J10.

(18) Adjust A3R89 to reduce the voltage at A3J10 to the highest positive value that will produce an identification power output of 72 milliwatts.

(19) Adjust A3R92 to obtain any desired power level below 72 milliwatts.

NOTE: The 578D-1 does not provide equalizer pulses. When equalizer pulses are supplied and the 860E-2 is adjusted per steps (16), (17), and (18), identification power is approximately 100 milliwatts.

(20) Replace transistor A4Q202 (type 2N1711) removed in paragraph 4.A.(10).

NOTE: For adjustment of signal-controlled search threshold A4R204, refer to paragraph 3.R. For adjustment of self-test zero A7R79, refer to paragraph 3.N.

L. Optional Wiring Procedures. (Refer to figure 728.)

(1) Fast/Slow Flag Connections.

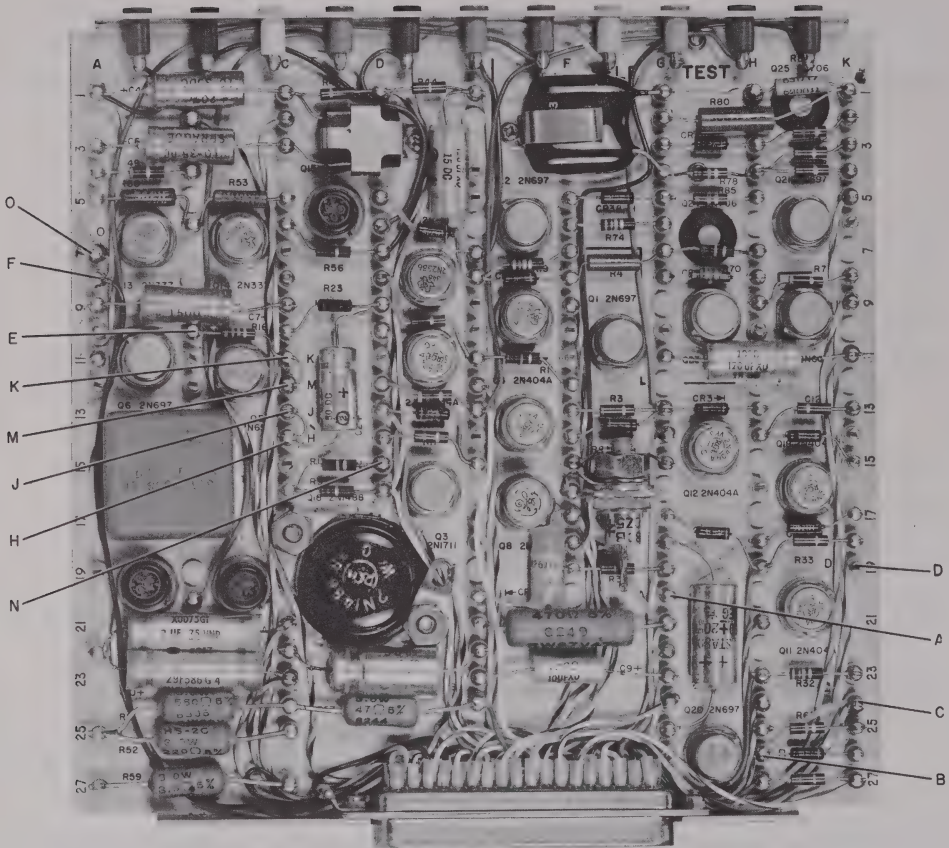
(a) For fast flag operation, connect E to F and H to J.

(b) For slow flag operation, connect O to F (disconnect E from F), and disconnect H and J.

(2) Static/Velocity Memory.

(a) For static memory, connect M to K.

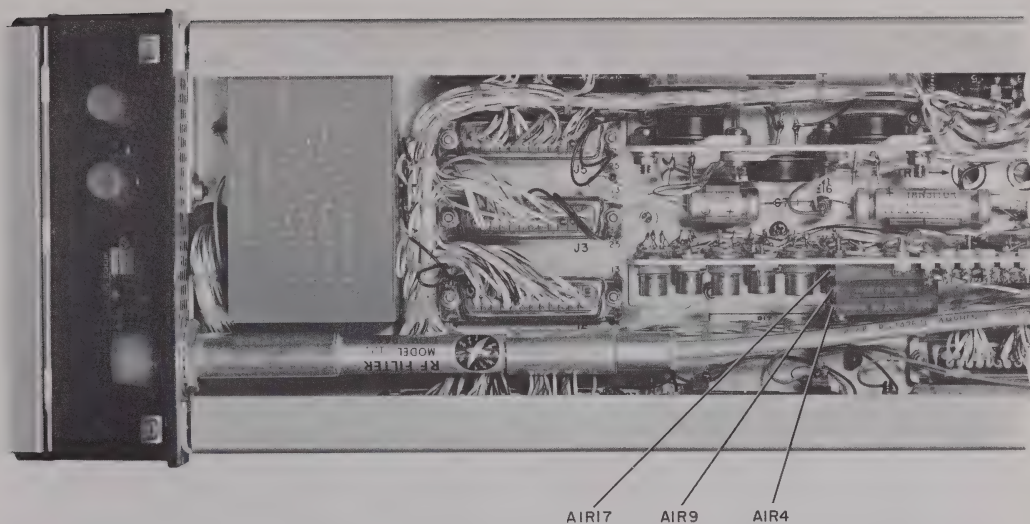
(b) For velocity memory, connect M to N.



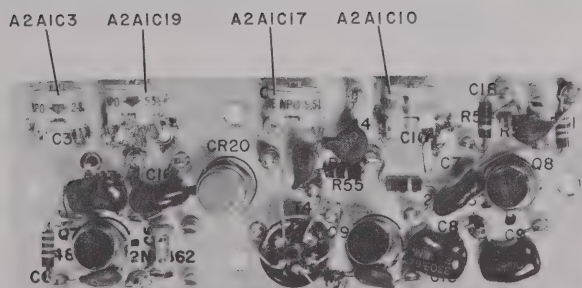
Tie Points For Custom Wiring
Figure 728

(3) Override Functions.

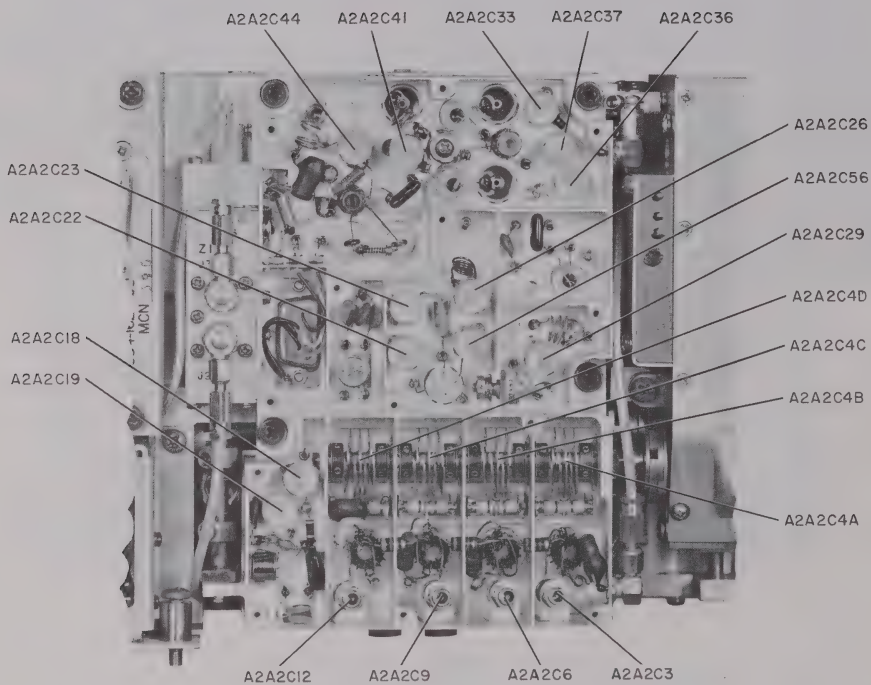
- (a) For ILS channels not overridable and TVOR channels overridable, connect A to ground and B to C.
- (b) For ILS channels and TVOR channels always overridden, connect A, B, and D to ground.
- (c) For ILS channels and TVOR channels overridable, connect A to ground and B to D and C.
- (d) For ILS channels overridable and TVOR channels always overridden, connect A to ground, C to D, and B to ground.



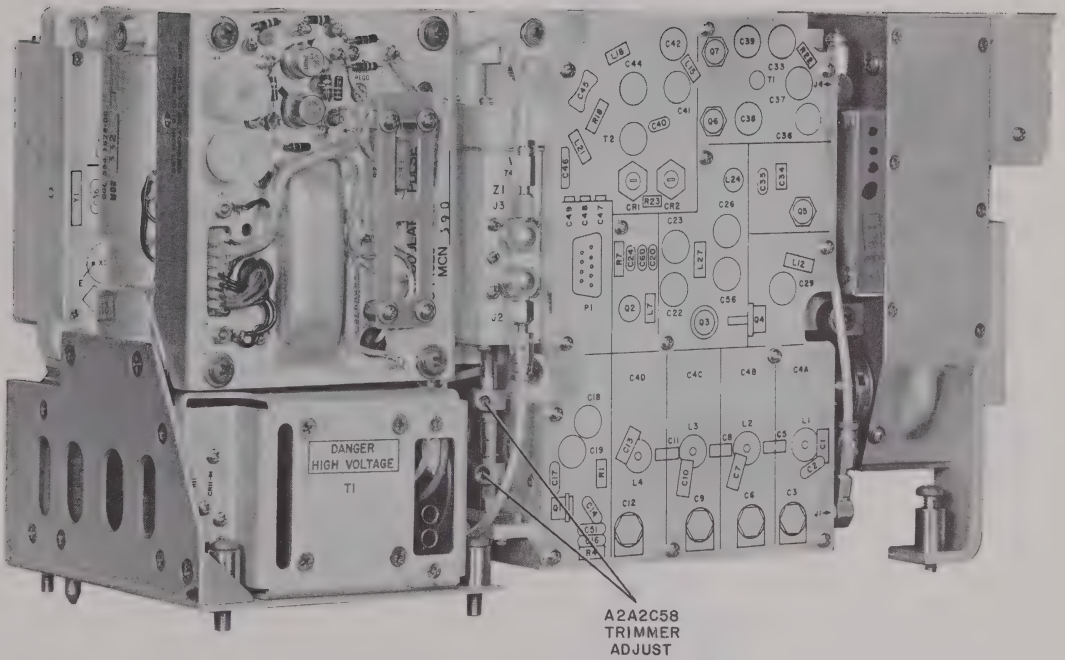
Module A1 Adjustment Points
Figure 729



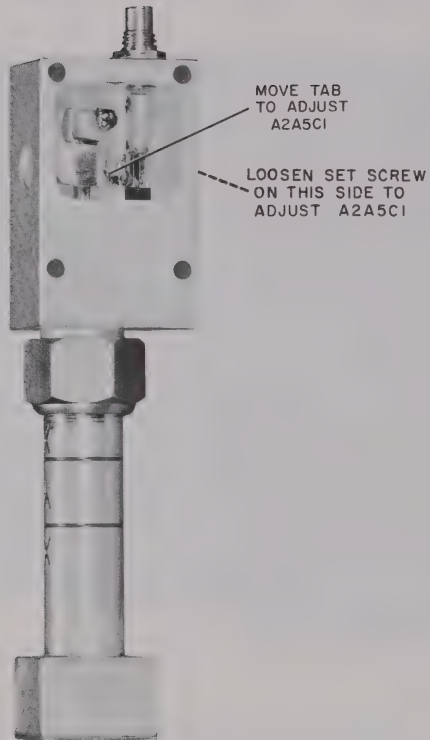
Subassembly A2A1 Adjustment Points
Figure 730



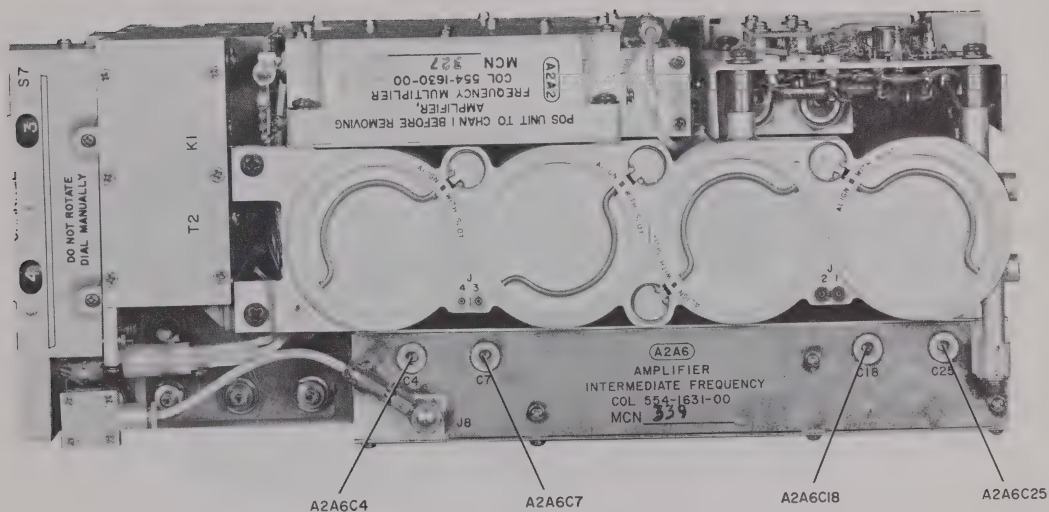
Subassembly A2A2 Adjustment Points
Figure 731



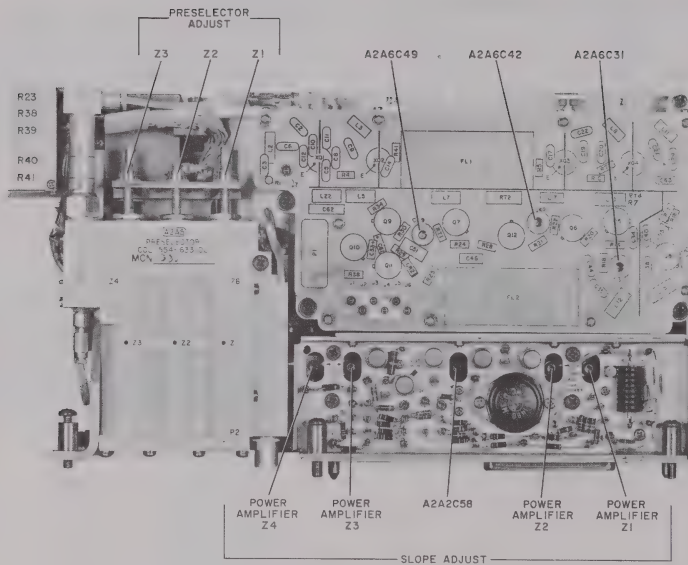
Tripler (A2A2C58) Trimmer Adjustment Point
Figure 732



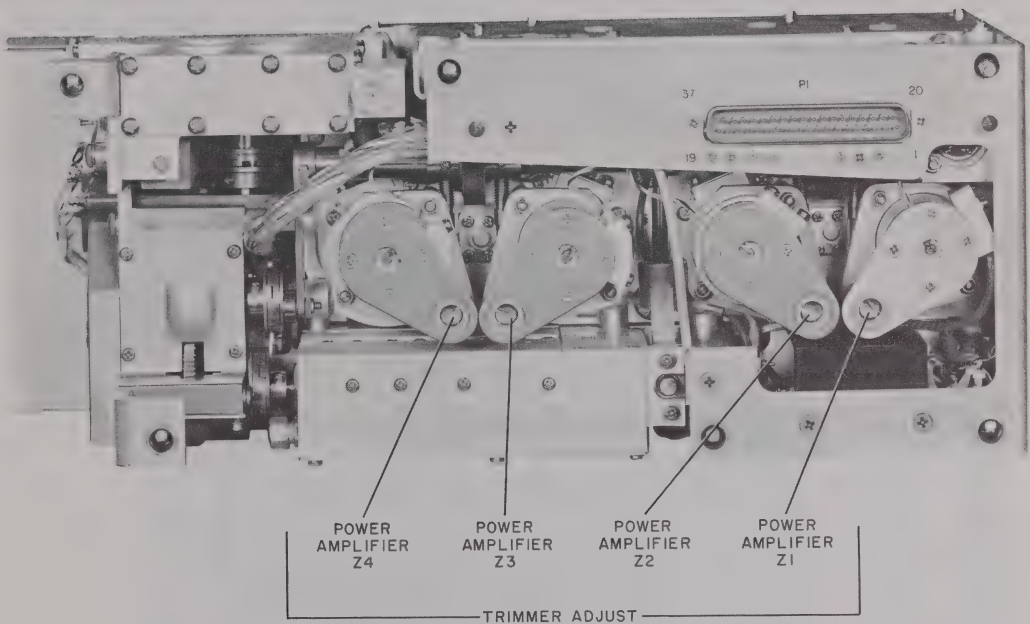
Crystal Current Adjustment Point
Figure 733



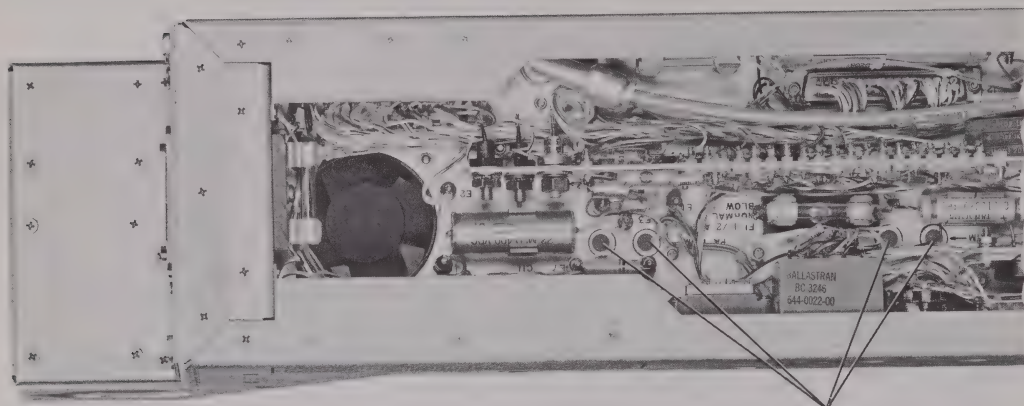
Subassembly A2A6 Adjustment Points
Figure 734



Preselector, Power Amplifier,
Tripler (A2A2C58), and Subassembly
A2A6 Adjustment Points
Figure 735

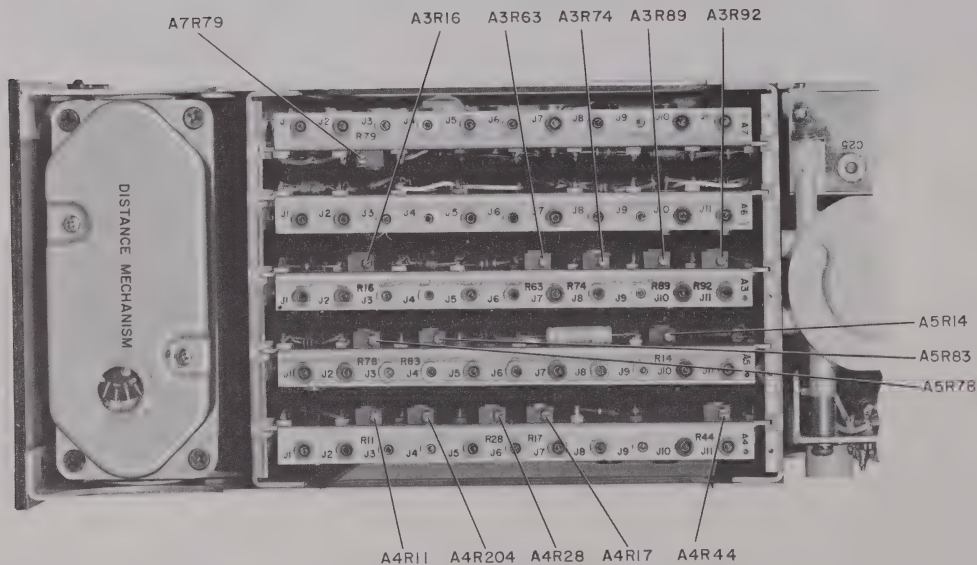


Power Amplifier Trimmer
Adjustment Points
Figure 736



POWER
AMPLIFIER
TRIMMER
ACCESS
HOLES

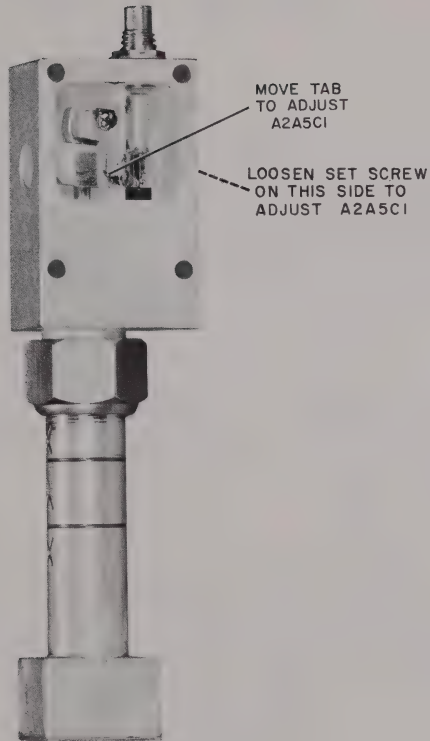
Power Amplifier Trimmer Access Holes
Figure 737



Board Adjustment Points
Figure 738



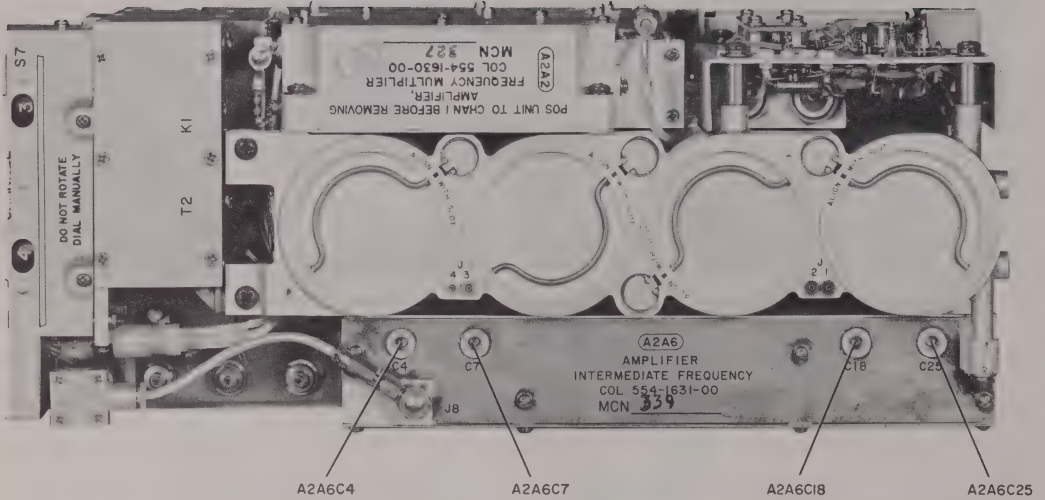
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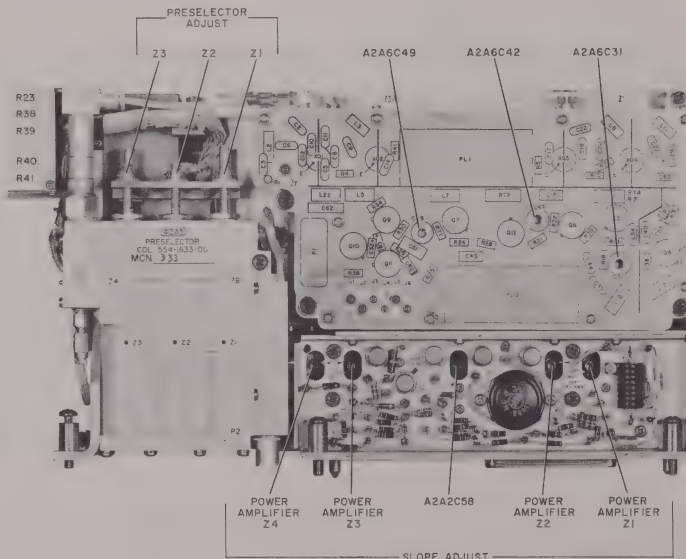
Crystal Current Adjustment Point
Figure 721



OVERHAUL MANUAL



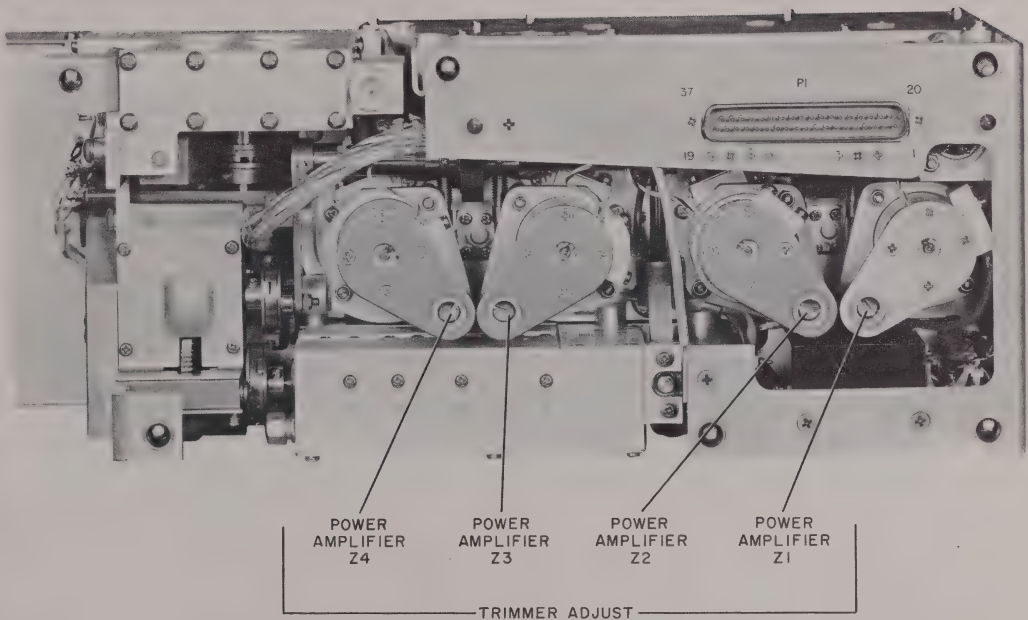
Subassembly A2A6 Adjustment Points
Figure 722



Preselector, Power Amplifier, Tripler (A2A2C58) and
Subassembly A2A6 Adjustment Points
Figure 723



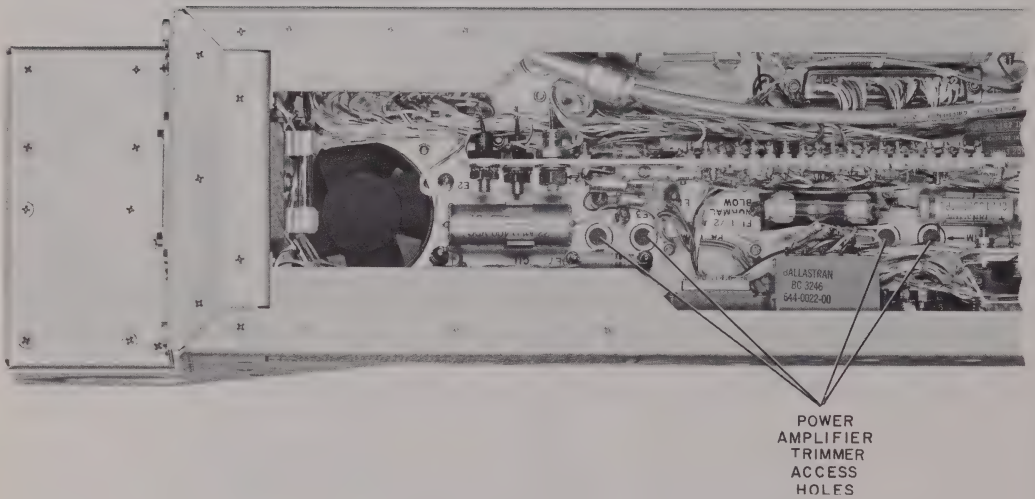
OVERHAUL MANUAL



Power Amplifier Trimmer Adjustment Points
Figure 724



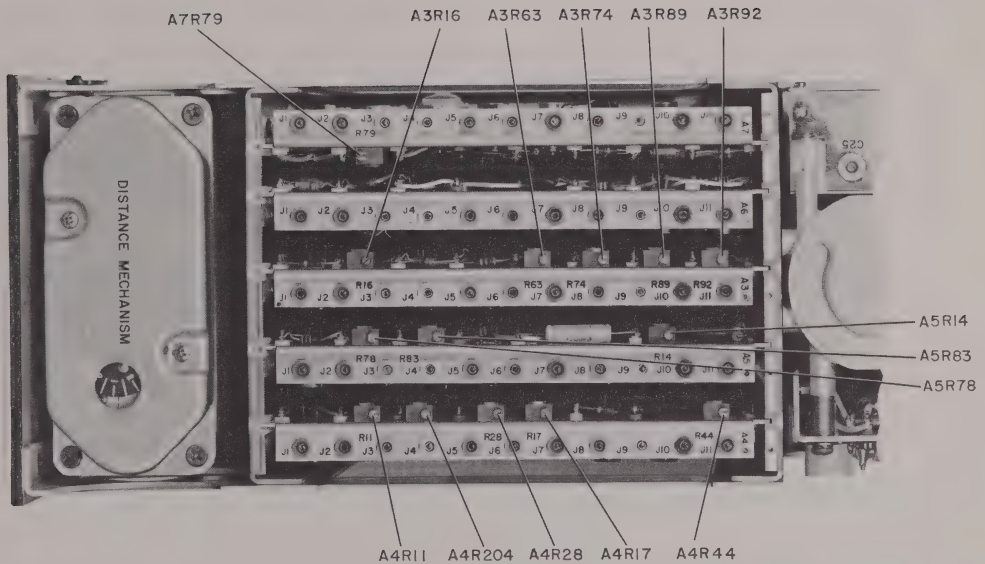
OVERHAUL MANUAL



Power Amplifier Trimmer Access Holes
Figure 725



OVERHAUL MANUAL



Board Adjustment Points
Figure 726



860E-2 Distance Measuring Equipment - Troubleshooting

1 GENERAL.

This section contains the procedures to isolate the cause of failure in a malfunctioning 860E-2. For best results the procedures must be performed in the order given and by maintenance personnel having a thorough understanding of the theory of operation of the 860E-2 and associated equipment.

2. POWER SUPPLY CHECK.

- A. Check fuses in power supply module.
- B. Connect the 860E-2 in the setup shown in figure 712.
- C. Remove the modules from the 860E-2.
- D. Position the DME control on the 578D-1 to STBY.
- E. Make the voltage readings on the pins indicated in figure 801.

3. TROUBLESHOOTING PROCEDURES.

A. General.

The procedures in the following paragraphs isolate the cause of failure to a small area. Isolation of the cause of failure to a component is then accomplished by referring to the theory of operation on the area in question.

To use these troubleshooting procedures the general type of malfunction must be known. If the type of malfunction is not known, test the 860E-2 according to the testing section of this manual until the type of malfunction is discovered.

Test equipment setup for troubleshooting must be as shown in the testing section of this manual, paragraph 3.A. or paragraph 3.D.

B. Does Not Lock On.

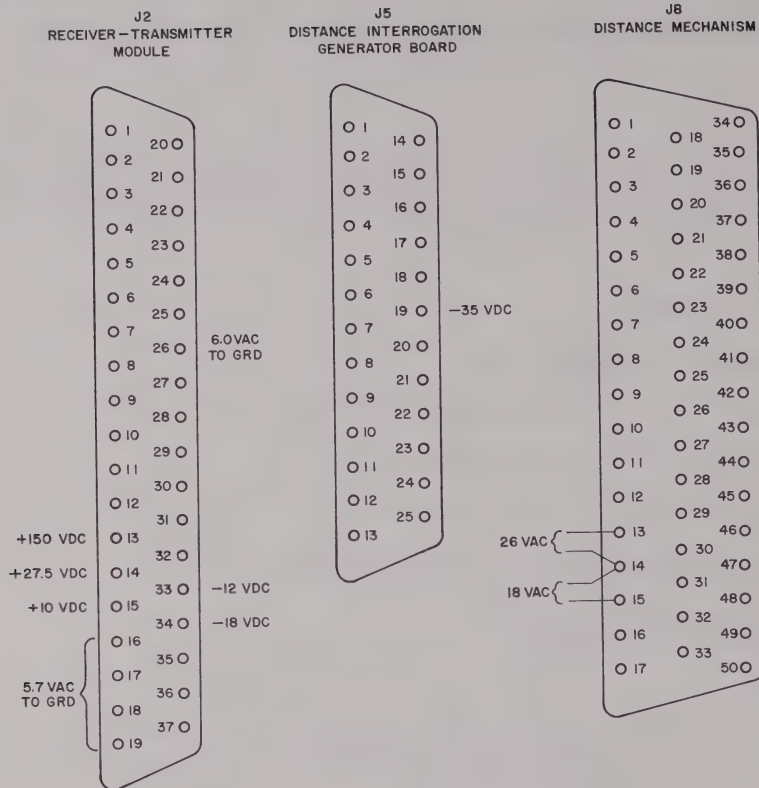
If the 860E-2 fails to lock on, but does continue to search, perform the checks listed in figure 802 until the trouble is isolated.

C. No Power Output.

If the 860E-2 power output is low, or if there is no power output, perform the checks listed in figure 803.



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Power Supply Voltage Readings
Figure 801

STEP	TEST POINT	IF INDICATION IS NORMAL PER FIGURE 807	IF INDICATION IS ABNORMAL
1	A3J7 (With SQUITTER RATE switch on 2700 and SYNC SELECTOR on SQUITTER)	Proceed to step 7.	Proceed to step 2.

Troubleshooting Procedures for No Lock-On (Sheet 1 of 3)
Figure 802

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STEP	TEST POINT	IF INDICATION IS NORMAL PER FIGURE 806	IF INDICATION IS ABNORMAL
2	A2A3J4	Proceed to step 3.	Proceed to trouble-shooting procedure for no transmitter output, paragraph 3C.
3	A2A6J5	Proceed to step 4.	Perform trouble-shooting procedure for low sensitivity per paragraph 3.D.
4	A3J4	Proceed to step 6.	Proceed to step 5.
5	A3J3	Probable cause of failure is A3Q7, Q8, Q9, Q10, Q11, Q12, and delay lines or associated circuits..	Probable cause of failure is A3Q1, Q2, Q3, Q4, or associated circuits.
6	A3J1	Probable cause of failure is A3Q16, Q17, Q18, or associated circuitry.	Probable cause of failure is A3Q14, Q15, or associated circuitry.
7	A6J4	Proceed to step 16.	Proceed to step 8.
8	A5J7	Probable cause of failure is A6, Q1, Q2, or associated circuitry.	Proceed to step 9.
9	A4J9	Proceed to step 13.	Proceed to step 10.
10	A4J10	Proceed to step 12.	Proceed to step 11.
11	A4J2	Probable cause of failure is A4Q15, Q16, Q17, distance resolver, or associated circuitry.	Probable cause of failure is A4Q1, A4Q2, Q3 resolver, or associated circuitry.
12	A4J8	Probable cause of failure A4CR9, CR10, Q20, or associated circuitry.	Probable cause of failure is A4Q18, Q19, or associated circuitry.
13	A5J11	Probable cause of failure is A5Q15, Q16, A5CR29, CR30, CR31, or associated circuitry.	Proceed to step 14.

Trouble-Shooting Procedures for No Lock-On (Sheet 2 of 3)
Figure 802



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STEP	TEST POINT	IF INDICATION IS NORMAL PER FIGURE 806	IF INDICATION IS ABNORMAL
14	A5J5	Proceed to step 15.	Probable cause of failure is A5Q1, Q2, Q5, Q6, or associated circuitry.
15	A5J8	Probable cause of failure is A5Q13, Q14, or associated circuitry.	Probable cause of failure is distance potentiometer A8R1 or associated circuitry.
16	A6J9	Proceed to step 20.	Proceed to step 17.
17	A6J3	Proceed to step 19.	Proceed to step 18.
18	A5J2	Probable cause of failure is A6Q8, Q9, or associated circuitry.	Probable cause of failure is A6Q6, Q7, or associated circuitry.
19	A6J7	Probable cause of failure is A6Q11 or associated circuitry.	Probable cause of failure is A6Q10 or associated circuitry.
20	A6J8	Probable cause of failure is A6Q21, Q20, rate feedback or associated circuitry.	Probable cause of failure is A6Q16 or associated circuitry.

Trouble-Shooting Procedures for No Lock-On (Sheet 3 of 3)
Figure 802

STEP	TEST POINT	IF INDICATION IS NORMAL PER FIGURE 806	IF INDICATION IS ABNORMAL
1	A5J2	Proceed to step 2.	Proceed to step 3.
2	A5J4	Proceed to step 10.	Probable cause of failure is A5Q7, A5Q8, or associated circuitry.
3	A4J3	Proceed to step 7.	Proceed to step 4.

Trouble-Shooting Procedures for No Transmitter Output (Sheet 1 of 2)
Figure 803



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STEP	TEST POINT	IF INDICATION IS NORMAL PER FIGURE 806	IF INDICATION IS ABNORMAL
4	A4J1	Proceed to step 6.	Proceed to step 5.
5	A4J2	Probable cause of failure is A4Q3, Q4, or associated circuitry.	Probable cause of failure is A4Q1, Q2, or associated circuitry.
6	A4J7	Probable cause of failure is A4Q8 or associated circuitry.	Probable cause of failure is A4Q5, Q6, Q7, or associated circuitry.
7	A4J6	Proceed to step 9.	Proceed to step 8.
8	A4J5	Probable cause of failure is A4Q14 or associated circuitry.	Probable cause of failure is A4Q9, Q10, or associated circuitry.
9	A5J3	Probable cause of failure is A5Q10, Q11, Q3, or associated circuitry.	Probable cause of failure is A5Q12, Q18, Q19, Q20, or associated circuitry.
10	Remove cap from no. 4 cavity and hold probe of oscilloscope near cavity opening. Pulses should be observed.	Proceed to step 11.	Probable cause of failure is in the modulator.
11	Take power reading at A2A2P2.	Probable cause of failure is in power amplifier tubes.	Make voltage checks per figure 806 on modules A2A2 and A2A1 to locate cause of failure. A quick check on transistors can be made by placing finger on top of each one and watching the output at A2A2P2. If transistor is bad, output will go up; if transistor is good, output will go down.

Trouble-Shooting Procedures for No Transmitter Output (Sheet 2 of 2)
Figure 803

D. Low Sensitivity.

(1) General.

If the 860E-2 has low sensitivity or there is no video at A2A6J5, make checks according to paragraph (2) to locate cause of failure.



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(2) Procedure.

- (a) Check crystal current at A2A6J7 with Triplet 630 volt ohmmeter on 60-ua scale. The current should be not less than 10 ua. If the current is low, attempt to adjust A2A5C1 as explained in paragraph 2.G. or 4.G. If corrections cannot be made, probable cause of failure is the crystal. If crystal current is correct, proceed to step (b).

(b) 10.7-Mc Amplifier Check.

1. Remove local oscillator transistor A2A6Q8.
2. Connect vtvm to A2A6J6 (+1-volt full scale).
3. Adjust HP608D to 10.70-mc output.

NOTE: Use frequency counter to ensure frequency accuracy of HP608D.

4. Inject a signal at the points listed below using the injection probe shown in figure 804. Adjust the signal level of the HP608D to obtain a +0.5-volt indication at test point A2A6J6; the signal level should be as listed below.

NOTE: The signal levels listed are representative readings and are subject to variation between radios.

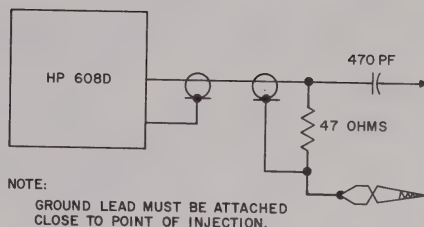
INJECTION POINT	HP608D OUTPUT FOR +0.5 VOLT AT A2A6J6	PROBABLE CAUSE OF FAILURE IF OUTPUT NOT OBTAINED
Junction of R25 and R26	-31 dbm ± 3 db	Q7
Junction of R21 and R23	-1.5 dbm ± 3 db	10.7-mc filter
Base of Q6	-31 dbm ± 3 db	Q6
Base of Q5	-64 dbm ± 3 db	Q5

(c) 63-Mc Amplifier Check.

1. Replace local oscillator transistor A2A6Q8.
2. Check operation of local oscillator: 1.8 volts rms minimum at collector of A2A6Q8 as measured with vtvm. If not obtained, probable cause of failure is in local oscillator.
3. Remove A2A6Q1.
4. Adjust output of HP608D to 63.00 mc.



5. Inject a -60-dbm signal at the base of A2A6Q4, and adjust A3R74 to obtain 0.5 volt d-c at A2A6J6.
6. Measure voltage at A2A6J4; it should be -3 to -5 volts d-c. If not probable cause of failure is in A2A6Q4 or agc circuits.
7. Inject a signal at the location listed below, and adjust signal to obtain a +0.5-volt d-c indication at A2A6J6. The signal level should be as listed.



Signal Injection Probe
Figure 804

INJECTION POINT	HP608D OUTPUT FOR 0.5 VOLT AT A2A6J6	PROBABLE CAUSE OF FAILURE IF OUTPUT NOT OBTAINED
Base of Q3	-60 dbm $\pm$ 3 db	Q3
Replace Q1		
Base of Q2	-53 dbm $\pm$ 3 db	Q2
Base of Q1	-63 dbm $\pm$ 3 db	Q1

8. If correct results in paragraphs (b) and (c) are obtained, probable cause of failure is in A2A6Q7 or A2A6Q10.

E. Does Not Search.

If the 860E-2 does not search correctly, make checks using figure 805.

STEP	TEST POINT	IF INDICATION IS NORMAL PER FIGURE 807	IF INDICATION IS ABNORMAL
1	A7J11	Proceed to step 2.	Proceed to step 7.
2	A7J5	Proceed to step 3.	Proceed to step 5.

Troubleshooting Procedures for No Search (Sheet 1 of 2)
Figure 805



STEP	TEST POINT	IF INDICATION IS NORMAL PER FIGURE 807	IF INDICATION IS ABNORMAL
3	A7J8	Probable cause of failure is the servo motor or associated circuitry.	Proceed to step 4.
4	A7J10	Probable cause of failure is A7Q16, A7Q17, or associated circuitry.	Probable cause of failure is A7Q13, Q14, Q15, or associated circuitry.
5	A7J6	Probable cause of failure is A7Q5, Q6, or associated circuitry.	Proceed to step 6.
6	A7J3	Probable cause of failure is A7Q1, Q4, or associated circuitry.	Probable cause of failure is the modulator control from channel selector (K1), standby control circuitry, A7Q1, the 60-second time delay, the signal-controlled search circuits, or A7Q23.
7	A6J5	Proceed to step 8.	Proceed to step 9.
8	A6J6	Probable cause of failure is A6Q25, Q26, or associated circuitry.	Probable cause of failure is chopper G1.
9	A6J8	Proceed to step 10.	Proceed to step 11.
10	A7J7	Probable cause of failure is in A6CR46, CR47, CR48, CR49, or associated circuitry.	Probable cause of failure is A6Q12, Q13, or associated circuitry.
11	A6J7	Proceed to step 12.	Proceed to step 13.
12	A6J9	Probable cause of failure is A6Q17, A7Q16, or associated circuitry.	Probable cause of failure is A6Q11 or associated circuitry.
13	A6J3	Probable cause of failure is A7Q10 or associated circuitry.	Probable cause of failure is A7Q9, Q8, or associated circuitry.

Troubleshooting Procedures for No Search (Sheet 2 of 2)
Figure 805

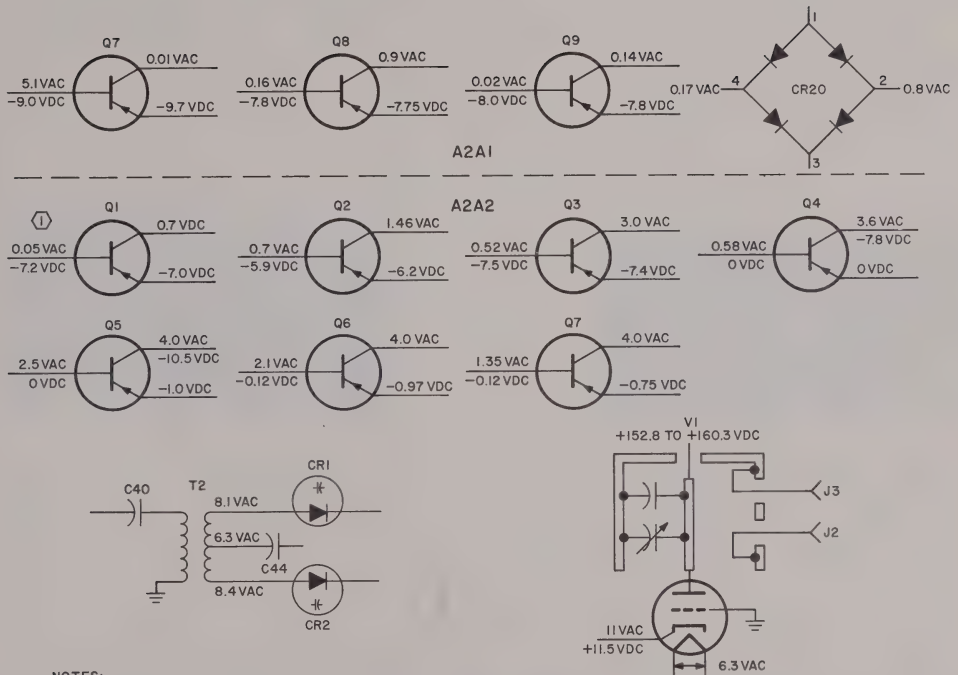


F. Flag Switch Transistor Test.

- (1) Operate 860E-2 in DMD in track mode (DME either locked on to simulated signal from test set/signal generator or locked on to self-test signal).
- (2) Connect a 135-ohm, 10-watt resistor between A7Q18 collector and ground J13 (J13 located on side panel of chassis). Connection to Q18 collector can best be accomplished by attaching clip lead to spade lug which is common to Q18 collector. A 28-volt, 170-ma light bulb may be used in place of the 135-ohm resistor. Collins part numbers for the bulb and indicator holder are 262-3270-00 and 262-0913-00 respectively.
- (3) Connect a dc voltmeter between A7Q18 collector and ground. The dc voltmeter should indicate less than 1.0 volt dc with flag out of view.
- (4) If the dc voltmeter indicates more than 1.0 volt dc, replace transistor A7Q18.
- (5) Disconnect the dc voltmeter and resistor from the 860E-2.



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NOTES:

- ① ALL VOLTAGES TAKEN WITH HEWLETT PACKARD 410BR ON CHANNEL 63 EXCEPT AC VOLTAGE AT BASE OF A2A2 Q1 TAKEN WITH BOONTOWN 91C-R.
- ② THESE VOLTAGE READINGS ARE TYPICAL AND WILL VARY BETWEEN UNITS.

Subassembly A2A1, Voltage Readings
Figure 806



A2A2J4

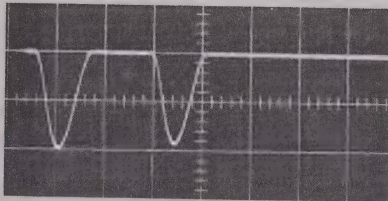
USE TO MEASURE TRANSMITTER FREQUENCY
POWER OUT: 0.1 MW MIN INTO 50 OHMS

CHAN 1	- 85.4166 MHZ	78	- 91.8334
12	- 86.3334	89	- 92.7500
23	- 87.2500	95	- 93.2500
34	- 88.1666	100	- 93.6666
45	- 89.0834	112	- 94.6666
56	- 90.0000	126	- 95.8334
67	- 90.9166		

+10 VDC MINIMUM

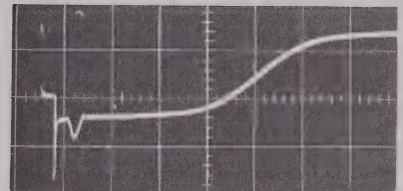
A2A2J5

NOTE: MEASURED ON VTVM



A2A3J4

5V/CM SYNC: EXTERNAL
5USEC/CM SUPPRESSOR
 PULSE
SEARCH



A2A4CR9 ANODE

200V/CM SYNC: EXTERNAL
20 USEC/CM SUPPRESSOR
 PULSE
SEARCH

+10 VDC

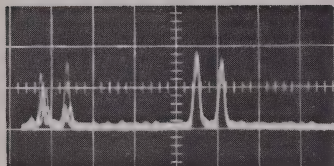
A2A6J3

APPROX -4.0VDC (NO SIGNAL INPUT)
APPROX -8.5VDC (-20DBM INPUT SIGNAL)

A2A6J4

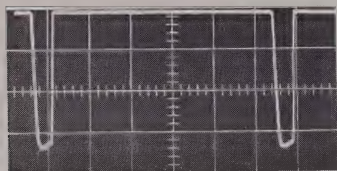
2700 SQUITTER

OVERHAUL MANUAL



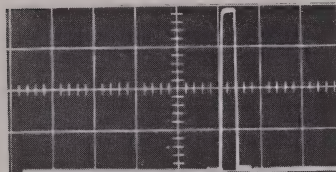
A2A6J6

20 USEC/CM TRACK-2 MILE RANGE
0.1 V/CM SYNC: TO SUPPRESSOR
100% REPLY SIGNAL LEVEL
2700 SQUITTER -80 DBM



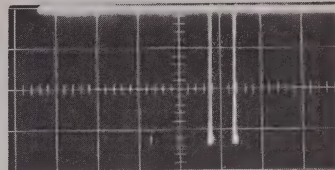
A3J3

20 USEC/CM ON A TRACK-2 MILE RANGE
2 V/CM ON A SYNC: SUPPRESSOR
20 USEC/CM ON B 2700 SQUITTER
A DELAYED BY B 100% REPLY
X CHANNEL SIGNAL LEVEL
-80 DBM



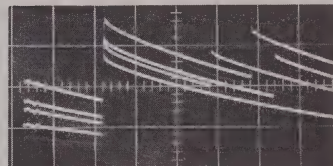
A3J7

2 V/CM SYNC: EXTERNAL SUPPRESSOR PULSE
20 USEC/CM TRACK-2 MILE RANGE
100% REPLY -80DBM SIGNAL LEVEL



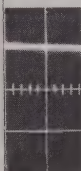
A3J3

20 USEC/CM SEARCH-2 MILE RANGE
2 V/CM SYNC: SUPPRESSOR PULSE
100% REPLY SIGNAL LEVEL
2700 SQUITTER -80 DBM
X CHANNEL



A3J6

0.5 V/CM SYNC: SUPPRESSOR
50 USEC/CM TRACK-2 MILES
100% REPLY -80DBM SIG LEVEL
2700 SQUITTER

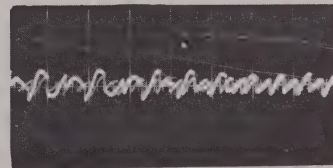


SUPPRESSOR
2 MILE RANGE
LEVEL-70DBM

TO DISABLE



SIGNAL
LEVEL



A3J9

1 V/CM SYNC: INTERNAL
1 MSEC/CM -80DBM SIGNAL LEVEL
2700 SQUITTER

Test Point Waveforms (Sheet 2 of 6)
Figure 807



A2A2J4

USE TO MEASURE TRANSMITTER FREQUENCY
POWER OUT: 0.1 MW MIN INTO 50 OHMS

CHAN 1	— 85.4166 MHZ	78	— 91.8334
12	— 86.3334	89	— 92.7500
23	— 87.2500	95	— 93.2500
34	— 88.1666	100	— 93.6666
45	— 89.0834	112	— 94.6666
56	— 90.0000	126	— 95.8334
67	— 90.9166		

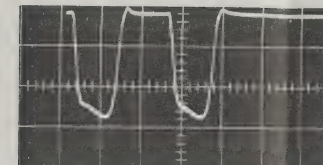
+10 VDC MINIMUM

GROUND

A2A2J5

NOTE: MEASURED ON VTVM

A2A3J1

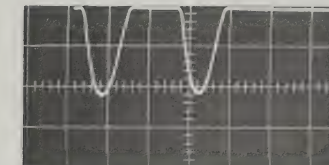


A2A3J2

1V/CM
5 USEC/CM

SYNC: EXTERNAL
SUPPRESSOR
PULSE

SEARCH

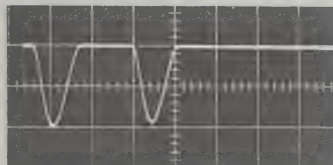


A2A3J3

10V/CM
5 USEC/CM

SYNC: EXTERNAL
SUPPRESSOR
PULSE

SEARCH

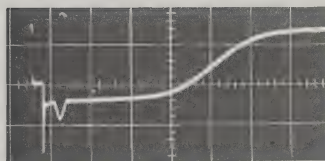


A2A3J4

5V/CM
5 USEC/CM

SYNC: EXTERNAL
SUPPRESSOR
PULSE

SEARCH

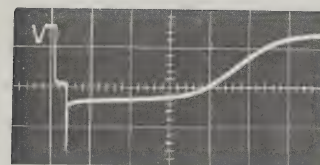


A2A4CR9 ANODE

200V/CM
20 USEC/CM

SYNC: EXTERNAL
SUPPRESSOR
PULSE

SEARCH



A2A4CR10 ANODE

200V/CM
20 USEC/CM

SYNC: EXTERNAL
SUPPRESSOR
PULSE

SEARCH

-12.5V

A2A6J1

-18VDC

A2A6J2

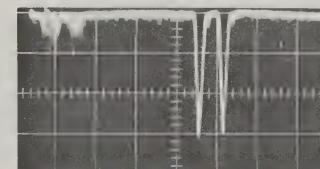
+10 VDC

A2A6J3

APPROX -4.0VDC (NO SIGNAL INPUT)
APPROX -8.5VDC (-20DBM INPUT SIGNAL)

A2A6J4

2700 SQUITTER

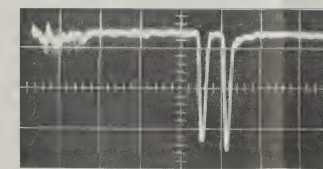


A2A6J5

.5V/CM
20 USEC/CM

SYNC: EXTERNAL
SUPPRESSOR
PULSE

100% REPLY -80DBM SIG LEVEL
2700 SQUITTER

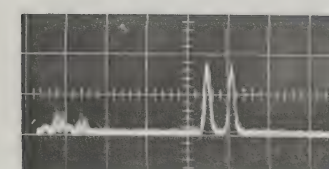


A2A6J5

.5V/CM
20 USEC/CM

SYNC: TO SUPPRESSOR
TRACK-2 MILE RANGE

100% REPLY -80DBM SIGNAL LEVEL
2700 SQUITTER

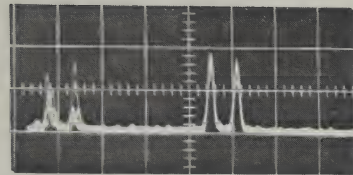


A2A6J6

0.1V/CM
20 USEC/CM

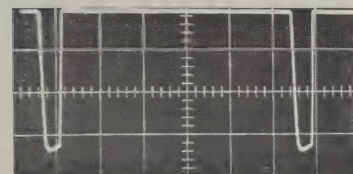
SYNC: TO SUPPRESSOR
SEARCH-2 MILE RANGE

100% REPLY -80DBM SIGNAL LEVEL
2700 SQUITTER



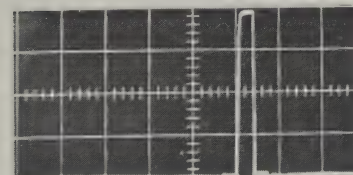
A2A6J6

20 USEC/CM TRACK-2 MILE RANGE
0.1 V/CM SYNC: TO SUPPRESSOR
100% REPLY SIGNAL LEVEL
2700 SQUITTER -80 DBM



A3J3

20 USEC/CM ON A TRACK-2 MILE RANGE
2 V/CM ON A SYNC: SUPPRESSOR
20 USEC/CM ON B 2700 SQUITTER
A DELAYED BY B 100% REPLY
X CHANNEL SIGNAL LEVEL
-80 DBM

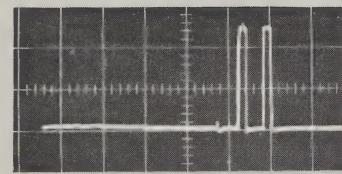


A3J7

2 V/CM SYNC: EXTERNAL SUPPRESSOR PULSE
20 USEC/CM
100% REPLY TRACK-2 MILE RANGE
-80 DBM SIGNAL LEVEL

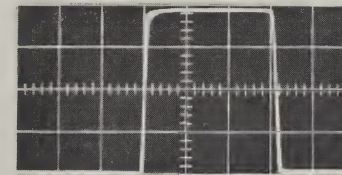
10 UAMP MIN
NOTE: MEASURED ON TRIPLETT MODEL
630 VOMOR EQUIVALENT
-60 UAMP SCALE

A2A6J7



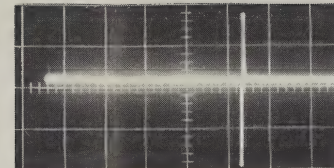
A3J4

20 USEC/CM SYNC: TO SUPPRESSOR
2 V/CM X CHANNEL
100% REPLY SIGNAL LEVEL-80 DBM
2700 SQUITTER SEARCH 2 MILE RANGE



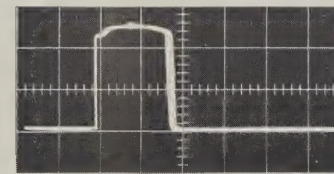
A3J7

2 V/CM SYNC: SUPPRESSOR
DELAY SWEEP SEARCH-2 MILES
A - 2 USEC/CM
B - 20 USEC/CM
(A DELAYED BY B) -80 DBM SIG LEVEL
100% REPLY



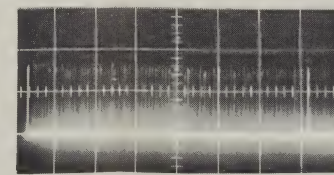
A3J1

20 USEC/CM SEARCH-2 MILE RANGE
2 V/CM SYNC: EXTERNAL SUPPRESSOR
100% REPLY SIGNAL LEVEL
-80 DBM



A3J4

2 USEC/CM ON A SYNC: TO EXTERNAL SUPPRESSOR
2 V/CM ON A
20 USEC/CM ON B X CHANNEL
100% REPLY SIGNAL LEVEL
2700 SQUITTER -80 DBM
SEARCH 2 MILE RANGE

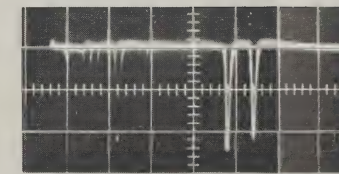


A3J8

2 V/CM SYNC: EXTERNAL SUPPRESSOR PULSE
1 MSEC/CM
100% REPLY SEARCH-2 MILE RANGE
2700 SQUITTER -80 DBM CHECK

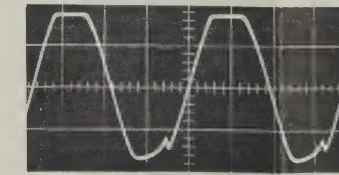
-5 VDC

A3J2



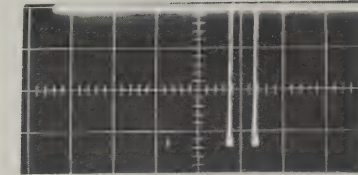
A3J5

1 V/CM SYNC: TO SUPPRESSOR
20 USEC/CM SEARCH-2 MILE RANGE
100% REPLY SIGNAL LEVEL-70 DBM
2700 SQUITTER
X CHANNEL
NOTE: Q22 REMOVED IN A3 BOARD TO DISABLE AGC CIRCUIT.



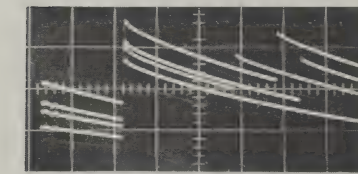
A3J9

1 V/CM SYNC: INTERNAL
0.2 MSEC/CM 80 DBM SIGNAL LEVEL
IDENT WITHOUT EQUALIZER PULSES



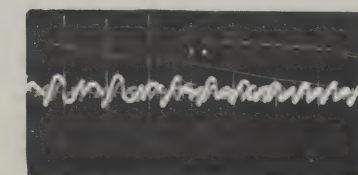
A3J3

20 USEC/CM SEARCH-2 MILE RANGE
2 V/CM SYNC: SUPPRESSOR PULSE
100% REPLY 2700 SQUITTER
X CHANNEL SIGNAL LEVEL
-80 DBM



A3J6

0.5 V/CM SYNC: SUPPRESSOR
50 USEC/CM TRACK-2 MILES
100% REPLY -80 DBM SIG LEVEL
2700 SQUITTER



A3J9

1 V/CM SYNC: INTERNAL
1 MSEC/CM -80 DBM SIGNAL LEVEL
2700 SQUITTER

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((

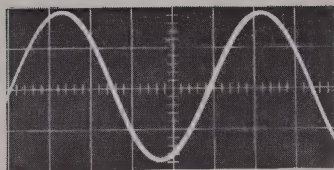
(



OVERHAUL MANUAL

NLT + 1.5 VDC

A3J10

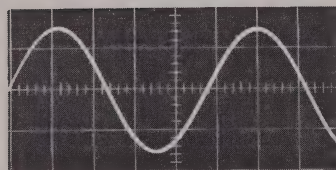


A4J2

5V/CM

SYNC: A4J2

50USEC/CM

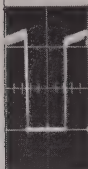


A4J5

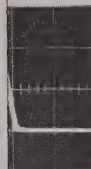
50 USEC/CM

SYNC: A4J2

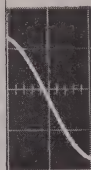
5V/CM



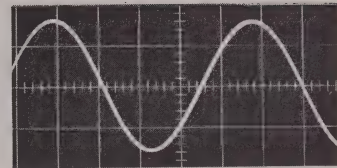
INTERNAL
G LEVEL
OHMS



EXTERNAL
PULSE
SEARCH



SYNC: A4J2
X CHANNEL



A4J1

5V/CM

SYNC: A4J2

50USEC/CM

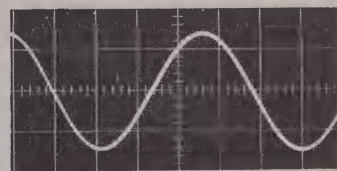
-6.2 VDC

X CHANNEL

+7.6 VDC

Y CHANNEL

A4J4



A4J8

50 USEC/CM

SYNC: A4J2

5 V/CM

TRACK 10 MILE RANGE

Test Point Waveforms (Sheet 3 of 6)
Figure 807

(f

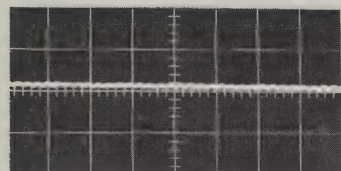
(f

(f

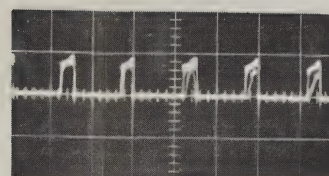


NLT + 1.5 VDC

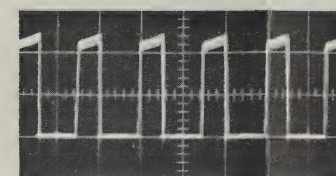
A3J10



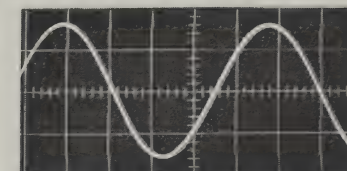
A3J11
1V/CM SYNC: INTERNAL
1MSEC/CM -80DBM SIGNAL LEVEL
SQUITTER INPUT LOAD - 200 OHMS



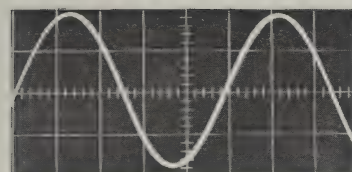
A3J11
0.5 MSEC/CM SYNC: INTERNAL
2 V/CM IDENT WITHOUT
LOAD - 200 OHMS EQUALIZER PULSE
SIGNAL LEVEL -
80 DBM



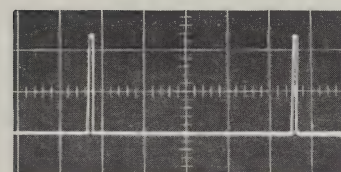
A3J11
2V/CM SYNC: INTERNAL
0.5MSEC/CM -80DBM SIG LEVEL
IDENT WITH EQUALIZER
PULSES LOAD - 200 OHMS



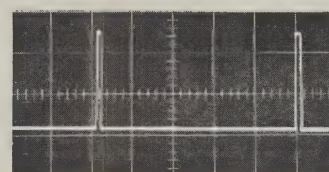
A4J1
5V/CM SYNC: A4J2
50USEC/CM



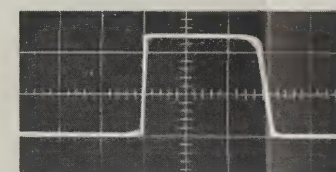
A4J2
5V/CM SYNC: A4J2
50USEC/CM



A4J3
50 USEC/CM SYNC A4J2
5 V/CM Y CHANNEL



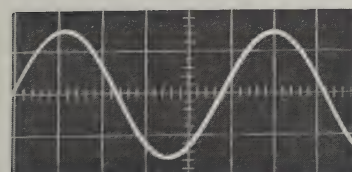
A4J3
50 USEC/CM SYNC: A4J2
5 V/CM X CHANNEL



A4J3
2 USEC/CM ON A SYNC: EXTERNAL
5 V/CM ON B SUPPRESSOR PULSE
50 USEC/CM ON B SEARCH
A DELAYED BY B

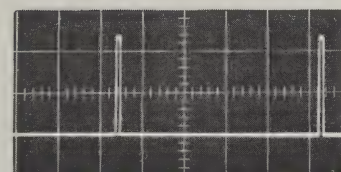
-6.2 VDC X CHANNEL
+7.6 VDC Y CHANNEL

A4J4

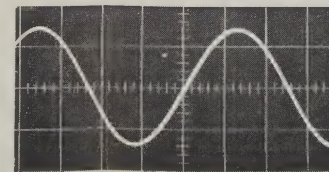


A4J5
50 USEC/CM SYNC: A4J2

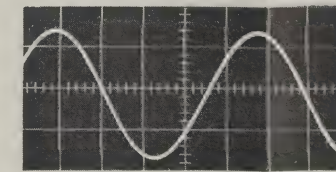
5V/CM



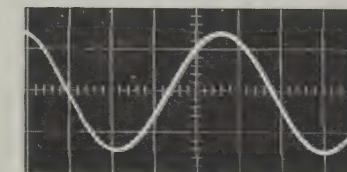
A4J6
5V/CM SYNC: A4J2
50USEC/CM



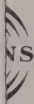
A4J7
50 USEC/CM SYNC: A4J2
5 V/CM Y CHANNEL



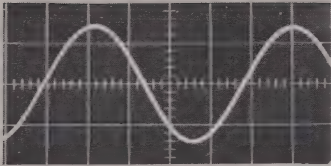
A4J7
50 USEC/CM SYNC: A4J2
5 V/CM X CHANNEL



A4J8
50 USEC/CM SYNC: A4J2
5 V/CM TRACK 10 MILE RANGE

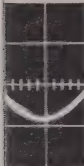


OVERHAUL MANUAL



A4J8

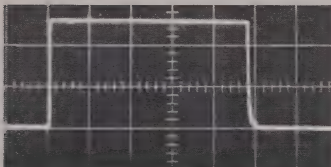
50 USEC/CM SYNC: A4J2
5 V/CM TRACK 0 MILE RANGE



GROUND

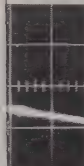
A4J11

50 USEC/CM SYNC: A4J2
5 V/CM TRACK 0 MILE RANGE

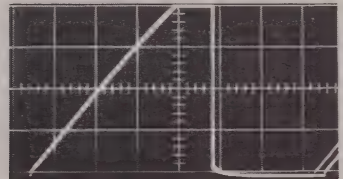


A5J1

10 V/CM
10 USEC/CM ON A SYNC: A5J3
20 USEC/CM ON B SEARCH
A DELAYED BY B



10 V/CM
10 USEC/CM ON A SYNC: A5J3
20 USEC/CM ON B SEARCH
A DELAYED BY B



A5J5

20 V/CM SYNC: EXTERNAL
1 MSEC/CM SUPPRESSOR PULSE
SEARCH

+100 VDC

A5J6

-5 VDC

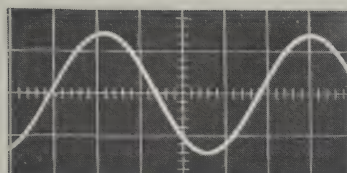
A5J9

Test Point Waveforms (Sheet 4 of 6)
Figure 807

(1)

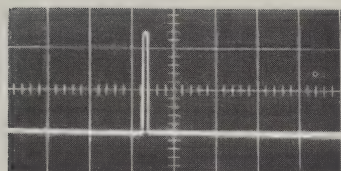
(2)

(3)



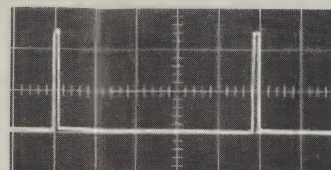
A4J8

50 USEC/CM SYNC: A4J2
5 V/CM TRACK 0 MILE RANGE



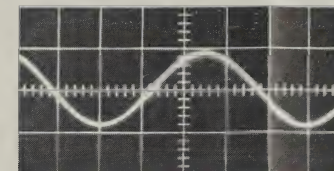
A4J9

50 USEC/CM SYNC: A4J2
5 V/CM TRACK 0 MILE RANGE



A4J10

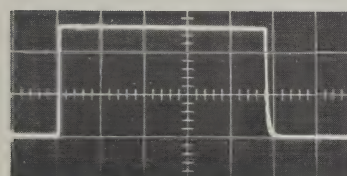
50 USEC/CM SYNC: A4J2
5 V/CM TRACK 10 MILE RANGE



GROUND

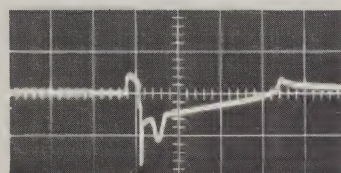
A4J11

50 USEC/CM SYNC: A4J2
5 V/CM TRACK 0 MILE RANGE



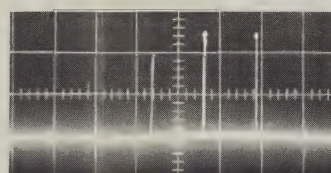
A5J1

10 V/CM
10 USEC/CM ON A SYNC: A5J3
20 USEC/CM ON B SEARCH
A DELAYED BY B



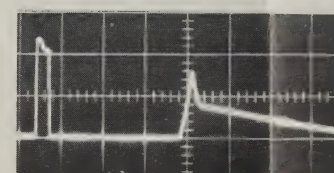
A5J2

20V/CM SYNC: A5J3
DELAYED SWEEP
(425)
A - 20USEC/CM
B - 50USEC/CM
(A DELAYED BY B)



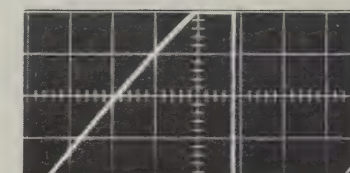
A5J3

1V/CM SYNC: EXTERNAL
DELAYED SWEEP SUPPRESSOR
(440) PULSE
A - 200USEC/CM SEARCH
B - 1MSEC/CM
(A DELAYED BY B)



A5J4

5V/CM SYNC: EXTERNAL
20USEC/CM SUPPRESSOR PULSE
X CHANNEL SEARCH 1 MILE RANGE

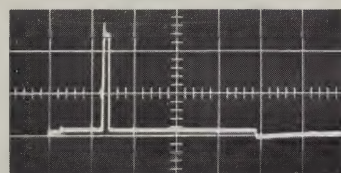


A5J5

20 V/CM SYNC: EXTERNAL
1 MSEC/CM SUPPRESSOR PULSE
SEARCH

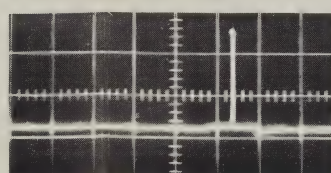
+100 VDC

A5J6



A5J7

50 USEC/CM TRACK - 0 MILE
RANGE
1V/CM SYNC: EXTERNAL
SUPPRESSOR
PULSE



A5J8

200 USEC/CM TRACK - 100 MILE
RANGE
1V/CM SYNC: EXTERNAL
SUPPRESSOR
PULSE

+60 VDC

A5J8

-5VDC

A5J9

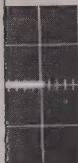
860E-2 Test Point Waveforms (Sheet 4 of 6)
Figure 807

April 15/64

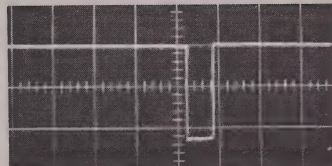
OVERHAUL MANUAL

30 VDC

A5J10

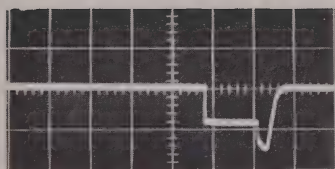


EXTERNAL
SUPPRESSOR PULSE
MILE RANGE



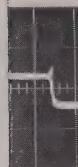
A6J2

5V/CM SYNC: EXTERNAL
10USEC/CM SUPPRESSOR
100% REPLY PULSE
TRACK- 0 MILES

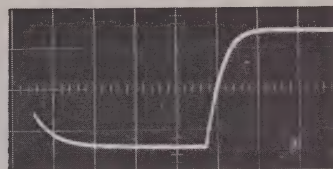


A6J3

10V/CM OVDC-SEARCH
10USEC/CM WITH DISTANCE
SYNC; EXTERNAL REPLY ONLY
SUPPRESSOR PULSE
+9VDC-TRACK WITH
TRACK -0 MILE 100% REPLY
RANGE EFFICIENCY

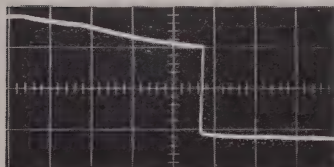


EXTERNAL
OUTBOUND



A6J7

2V/CM TRACE-SEARCH TO
0.1 SEC/CM PREMEMORY CHANGE
-4VDC-SEARCH WITH
SYNC; EXTERNAL DISTANCE REPLY ONLY
SUPPRESSOR +2VDC-LOCK ON WITH
100% REPLY 100% REPLY
EFFICIENCY



A6CR28 ANODE

5 V/CM PREMEMORY AND
.5 SEC/CM TOGGLE ACTION

DC
VDC

- 2VDC SEARCH
+ 4.3 VDC TRACK

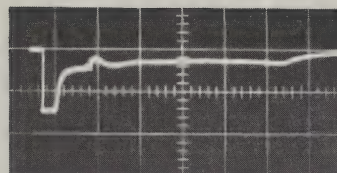
A6J11

Test Point Waveforms (Sheet 5 of 6)
Figure 807

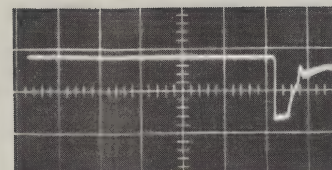


30 VDC

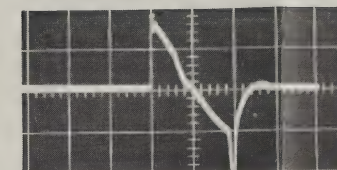
A5J10



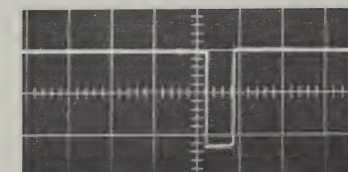
A5J11
50 USEC/CM SYNC: EXTERNAL
5 V/CM SUPPRESSOR PULSE
TRACK 0 MILE RANGE
X CHANNEL



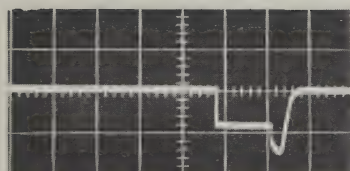
A5J11
200 USEC/CM SYNC: EXTERNAL
5 V/CM SUPPRESSOR PULSE
TRACK 100 MILE RANGE
X CHANNEL



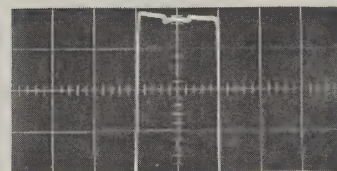
A6J1
10 V/CM SYNC: EXTERNAL
10 USEC/CM SUPPRESSOR PULSE
TRACK 0 MILE RANGE



A6J2
5V/CM SYNC: EXTERNAL
10 USEC/CM SUPPRESSOR PULSE
100% REPLY TRACK- 0 MILES



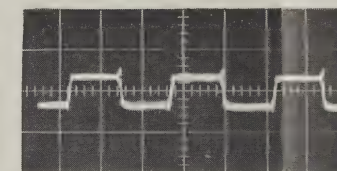
A6J3
10V/CM 0VDC-SEARCH
10USEC/CM WITH DISTANCE
SYNC; EXTERNAL REPLY ONLY
SUPPRESSOR PULSE +9VDC-TRACK WITH
TRACK - 0 MILE 100% REPLY
RANGE EFFICIENCY



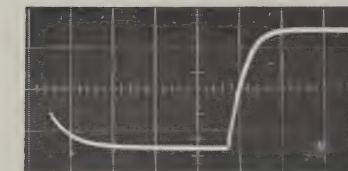
A6J4
2V/CM SYNC: EXTERNAL
10USEC/CM SUPPRESSOR PULSE
TRACK- 0 MILES

0 VDC LOCKED ON STATIONARY TARGET
+0.3VDC INBOUND SLEW
-0.3VDC OUTBOUND SEARCH

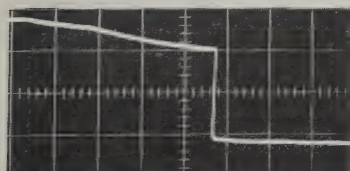
A6J5



A6J6
1MSEC/CM SYNC: INTERNAL
.5 V/CM SEARCH-OUTBOUND



A6J7
2V/CM TRACE- SEARCH TO
0.1 SEC/CM PREMEMORY CHANGE
SYNC; EXTERNAL -4VDC-SEARCH WITH
SUPPRESSOR DISTANCE REPLY ONLY
100% REPLY +2VDC- LOCK ON WITH
EFFICIENCY 100% REPLY



A6CR28 ANODE
5 V/CM PREMEMORY AND
.5 SEC/CM TOGGLE ACTION

DISTANCE REPLY ONLY: -14 VDC SEARCH
100% REPLY EFFICIENCY: 1.2 VDC

A6J8

DISTANCE REPLY ONLY: +8.7 VDC SEARCH
100% REPLY EFFICIENCY +0.1 VDC TRACK

A6J9

INBOUND SLEW: +7.2 VDC
OUTBOUND SEARCH: 9.7 VDC

A6J10

- 2VDC SEARCH
+ 4.3 VDC TRACK

A6J11



OVERHAUL MANUAL

-15 VDC MODULATOR ON
+4.6 VDC MODULATOR OFF

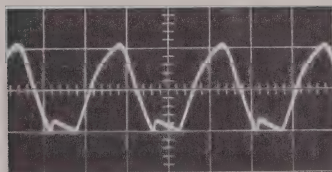
+23 VDC SERVO LOCK OFF
+0.35 VDC SERVO LOCK ON

A7J4

A7J5

9.8 VDC - SEARCH
-1.75 VDC - TRACK

A7J9



A7J10

2.0 V/CM
1 MSEC/CM

SYNC: INTERNAL
OUTBOUND SEARCH

860E-2 Test Point Waveforms (Sheet 6 of 6)
Figure 807



-9.1VDC TRACK
-9.1VDC OUTBOUND SEARCH
-11.5 INBOUND SLEW

A7J1

-18 VDC MODULATOR OFF-INBOUND SLEW
-18 VDC MODULATOR OFF-60 SECOND DELAY TIME
-18 VDC MODULATOR OFF-CHANNELING
+0.1 VDC MODULATOR ON-OUTBOUND SEARCH

A7J2

-4 VDC CHANNELING
-4.6VDC 60 SECOND TIME DELAY
-0.5 VDC STANDBY
+4.6VDC OUTBOUND SEARCH OR
INBOUND SLEW

A7J3

-15 VDC MODULATOR ON
+4.6 VDC MODULATOR OFF

A7J4

+23 VDC SERVO LOCK OFF
+0.35 VDC SERVO LOCK ON

A7J5

-1VDC - TRACK
-4VDC - SEARCH
+1.4V - STATIC MEMORY, STANDBY, 60SECOND
TIME DELAY, DURING CHANNELING
-6V - SEARCH
-3.5V - TRACK
+1.4V - STANDBY, 60SECOND TIME DELAY,
DURING CHANNELING

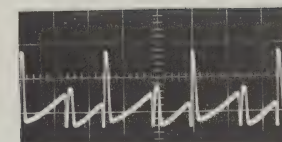
JUMPER
K-M
CONNECTED

JUMPER
M-N
CONNECTED

A7J6

-15 VDC - SEARCH
-0.8 VDC - TRACK, MEMORY, STANDBY,
60 SECOND TIME DELAY,
DURING CHANNELING

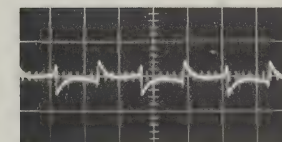
A7J7



A7J8

1.0 V/CM
1 MSEC/CM

SYNC: INTERNAL
SEARCH-OUTBOUND



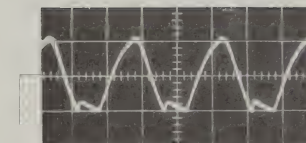
A7J11

0.5 V/CM
1 MSEC/CM

SYNC: INTERNAL
SEARCH-OUTBOUND

-9.8 VDC - SEARCH
-1.75 VDC - TRACK

A7J9



A7J10

2.0 V/CM
1 MSEC/CM

SYNC: INTERNAL
OUTBOUND SEARCH

860E-2 Test Point Waveforms (Sheet 6 of 6)
Figure 807

(

(

(



860E-2 Distance Measuring Equipment - Storage Instructions

1. GENERAL.

If the 860E-2 Distance Measuring Equipment is to be stored for a prolonged period, replace it in the original shipping carton. Make certain that all modules are secured to the chassis, and that the dust cover is attached.

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860E-2 Distance Measuring Equipment - Special Tools, Fixtures, and Equipment

1. GENERAL.

This section provides a list of all test equipment required to test and adjust the 860E-2 Distance Measuring Equipment and contains a general description of the special test equipment needed.

2. TEST EQUIPMENT REQUIRED.

Figure 1001 identifies all the test equipment required to test and adjust the 850E-2 and each module contained within the 860E-2. Figure 1002 lists the test cables required to test and adjust the equipment. Connector data is also furnished. Figure 1002A shows a handle that can be fabricated to aid in the placement and removal of the board extender cables.

ITEM	MANUFACTURER	MODEL DESIGNATION
DME Bench Test Set	Collins Radio Company	578D-1 (CPN 522-1838-)* used with Hewlett-Packard 612A.
Oscilloscope	Tektronix	545A with C-A dual trace plug-in head
Frequency Counter	Hewlett-Packard	524D with 525A plug-in head
VTVM	Hewlett-Packard	410B
R-F Milliammeter with Internal Thermocouple		0-50 ma
VHF Signal Generator	Hewlett-Packard	608D
VOM	Triplett	630A
Microwave Power Meter	Hewlett-Packard	431B with 478A thermistor mount
Spectrum Analyzer	Lavoie Lab	LA-18M
Sweep Signal Generator	Boonton Radio Corp.	240A
Dc voltmeter	John Fluke	800D

Test Equipment Required (Sheet 1 of 2)
Figure 1001



OVERHAUL MANUAL

ITEM	MANUFACTURER	MODEL DESIGNATION
Headphones		200 - 5000 ohms
**UHF Signal Generator	Hewlett-Packard	612A
Detector	Telonic	XD3AS with reversed diode to provide positive output pulse.
Peak Power Calibrator	Boonton Radio Corp.	8900A
Directional Coupler	Hewlett-Packard	766D
60-Db Attenuator	Empire Devices	AT-75-60
40-Db Attenuator	Empire Devices	AT-75-40
16-Db Attenuator	General Radio Co.	87 4G16
10-Db Attenuator	General Radio Co.	87 4G10
**Test Set	Boonton	235A
**ATC-DME Test Set	Boonton	8925A
Adjustment Cover for module A2A2	Special. See paragraph 6.	
*The 578D-1 must be modified by installation of modification kit, part number 548-2289-00, when the Hewlett-Packard 612A Signal Generator is to be used. The 578D-1 must be modified by installation of modification kit, part number 757-3147-001, when the Boonton 8925A ATC-DME Test Set is to be used. **The Hewlett-Packard 612A, the Boonton 235A, or the Boonton 8925A is required.		

Test Equipment Required (Sheet 2 of 2)

Figure 1001



860E-2 Distance Measuring Equipment - Special Tools, Fixtures, and Equipment

1. GENERAL.

This section provides a list of all test equipment required to test and adjust the 860E-2 Distance Measuring Equipment and contains a general description of the special test equipment needed.

2. TEST EQUIPMENT REQUIRED.

Figure 1001 identifies all the test equipment required to test and adjust the 850E-2 and each module contained within the 860E-2. Figure 1002 lists the test cables required to test and adjust the equipment. Connector data is also furnished. Figure 1002A shows a handle that can be fabricated to aid in the placement and removal of the board extender cables.

ITEM	MANUFACTURER	MODEL DESIGNATION
DME Bench Test Set	Collins Radio Company	578D-1 (CPN 522-1838-)* used with Hewlett-Packard 612A.
Oscilloscope	Tektronix	545A with C-A dual trace plug-in head
Frequency Counter	Hewlett-Packard	524D with 525A plug-in head
VTVM	Hewlett-Packard	410B
R-F Milliammeter with Internal Thermocouple		0-50 ma
VHF Signal Generator	Hewlett-Packard	608D
VOM	Triplett	630A
Microwave Power Meter	Hewlett-Packard	431B with 478A thermistor mount
Spectrum Analyzer	Lavoie Lab	LA-18M
Sweep Signal Generator	Boonton Radio Corp.	240A

Test Equipment Required (Sheet 1 of 2)
Figure 1001



OVERHAUL MANUAL

ITEM	MANUFACTURER	MODEL DESIGNATION
Headphones		200 - 5000 ohms
**UHF Signal Generator	Hewlett-Packard	612A
Detector	Telonic	XD3AS with reversed diode to provide positive output pulse.
Peak Power Calibrator	Boonton Radio Corp.	8900A
Directional Coupler	Hewlett-Packard	766D
60-Db Attenuator	Empire Devices	AT-75-60
40-Db Attenuator	Empire Devices	AT-75-40
16-Db Attenuator	General Radio Co.	87 4G16
10-Db Attenuator	General Radio Co.	87 4G10
**Test Set	Boonton	235A
**ATC-DME Test Set	Boonton	8925A
Adjustment Cover for module A2A2	Special. See paragraph 6.	

*The 578D-1 must be modified by installation of modification kit, part number 548-2289-00, when the Hewlett-Packard 612A Signal Generator is to be used. The 578D-1 must be modified by installation of modification kit, part number 757-3147-001, when the Boonton 8925A ATC-DME Test Set is to be used.

**The Hewlett-Packard 612A, the Boonton 235A, or the Boonton 8925A is required.

Test Equipment Required (Sheet 2 of 2)

Figure 1001



OVERHAUL MANUAL

CABLE DESIGNATION	MALE CONNECTOR TYPE	FEMALE CONNECTOR TYPE	CONNECTOR CLAMP TYPE (2 of each reqd)
50-pin extender cable	Cannon DD-50P Collins Part Number 371-0033-00	Cannon DDF-50S-1 Collins Part Number 871-0044-00	Cannon DD Collins Part Number 371-0148-00
9-pin extender cable	Cannon DE-9P Collins Part Number 371-0047-00	Cannon DEF-95-1 Collins Part Number 371-0048-00	Cannon DE Collins Part Number 371-0144-00
15-pin extender cable	Cannon DA-15P Collins Part Number 371-0020-00	Cannon DAF-15S-1 Collins Part Number 371-0041-00	Cannon DA Collins Part Number 371-0145-00

Test Cables Required (Sheet 1 of 2)
Figure 1002



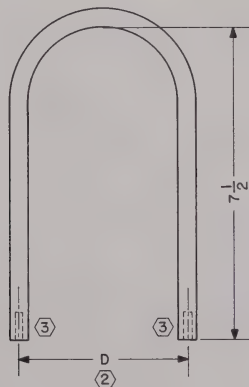
OVERHAUL MANUAL

CABLE DESIGNATION	MALE CONNECTOR TYPE	FEMALE CONNECTOR TYPE	CONNECTOR CLAMP TYPE (2 of each reqd)
25-pin extender cable	Cannon DB-25P Collins Part Number 371-0031-00	Cannon DCF-25S-1 Collins Part Number 371-0042-00	Cannon DB Collins Part Number 371-0146-00
37-pin extender cable	Cannon DC-37P Collins Part Number 371-0029-00	Cannon DCF-37S-1 Collins Part Number 371-0043-00	Cannon DC Collins Part Number 371-0147-00

Test Cables Required (Sheet 2 of 2)
Figure 1002

3. DESCRIPTION OF 578D-1 DME BENCH TEST SET.

The 578D-1 DME Bench Test Set, Collins part number 522-1838-016, is used to test, adjust, and trouble shoot 860E-2 Distance Measuring Equipment. Figure 1003 is a front panel view of the 578D-1. All controls required for operation of the 860E-2 are provided on the front panel of the 578D-1. Figure 1004 lists the equipment supplied with the 578D-1.



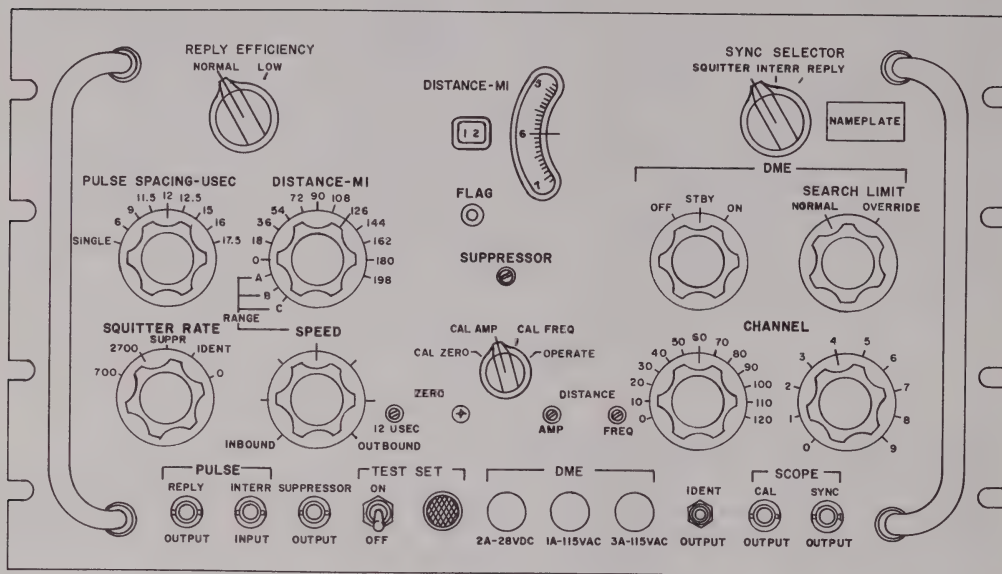
NOTES:

- ① MADE OF 3/16-INCH ALUMINUM ROD, TYPE 6061-T6.
- ② D EQUALS 1.852 ± 0.020 INCHES FOR 25-PIN CONNECTORS.
D EQUALS 2.500 ± 0.020 INCHES FOR 37-PIN CONNECTORS.
- ③ TAP 4-40 X 1/4 INCH DEEP.

Extender Cable Handle
Figure 1002A



OVERHAUL MANUAL



TP0-6040-012

578D-1 DME Bench Test Set
Figure 1003

COMPONENT	TYPE	COLLINS PART NUMBER
Cable assembly	Electrical	547-2034-00
Power cord	2-conductor, for 60 Hz	426-5041-00
Connector	Female, 3-conductor, for 400 Hz	368-0005-00
Connector	Female, 2-conductor, for 400 Hz	368-0010-00
Cable	Multiconductor	547-2028-004
Adapter	115-volt a-c, 60 Hz	368-0110-00

578D-1 DME Bench Test Set, Equipment Supplied (Sheet 1 of 2)
Figure 1004



OVERHAUL MANUAL

COMPONENT	TYPE	COLLINS PART NUMBER
Cable no. 1	RG-62A/U, 6 ft	547-2006-003
Cable no. 2	RG-62A/U, 6 ft	547-2007-003
Cable no. 3	RG-62A/U, 6 ft	547-2008-003
Cable no. 4	RG-62A/U, 6 ft	547-2009-003
Cable no. 5	RG-62A/U, 6 ft	547-2010-003
Cable no. 6	RG-62A/U, 6 ft	547-2011-003
Cable no. 7	RG-62A/U, 2 ft	547-2012-003
Cable no. 8	RG-62A/U, 2 ft	547-2013-003

578D-1 DME Bench Test Set, Equipment Supplied (Sheet 2 of 2)
Figure 1004

The 578D-1 accepts and decodes detected interrogations from the 860E-2 and provides accurately calibrated delays to simulate various distances. Squitter pulses are added, and after encoding, the resulting reply pulse signals are supplied to a Hewlett-Packard 612A signal generator which generates the r-f reply signal. Tests of DME accuracy are accomplished by front panel selection of time delays calibrated for specific fixed distances. The corresponding distance indication obtained from the 860E-2 is presented on the front panel of the 578D-1 by means of a three-digit synchro-driven display which accurately simulates the distance indicator normally used in the DME installation. The display of the third digit is designed for a reading accuracy of better than ± 0.1 mile. Dynamic tracking performance of the DME may be tested by selecting a variable distance function which inserts a time delay varying at a selectable rate up to a simulated 3000 knots. Various reply pulse spacings, centered on the normal value of 12 microseconds, are available for testing the DME decoder. Two reply efficiencies and two squitter rates are provided as well as identity tone operation. Figure 1005 lists all the controls, indicators, and connectors on the 578D-1 and their functions.

CONTROL	FUNCTION
REPLY EFFICIENCY	Select either of two reply efficiencies.
PULSE SPACING-USEC	Select various reply pulse spacings.

578D-1 DME Bench Test Set Controls, Indicators, and Connectors (Sheet 1 of 3)
Figure 1005



OVERHAUL MANUAL

CONTROL	FUNCTION
DISTANCE-MI	Select time delays corresponding to various distances.
SQUITTER RATE	Select desired squitter frequency.
SPEED	Select a varying time delay. Used in conjunction with the DISTANCE-MI control to simulate an aircraft approaching or leaving a VORTAC facility.
SYNC SELECTOR	Select the desired synchronizing signal.
DME OFF/STBY/ON	Select the off, receive, or interrogate mode of operation of the 860E-2.
DME SEARCH LIMIT	Control the searching range of the 860E-2.
CHANNEL (2)	Select desired 860E-2 operating channel.
TEST SET ON/OFF	Apply power to 578D-1.
SUPPRESSOR, ZERO, AMP, FREQ, and function switch.	Used during calibration of the 578D-1.
INDICATOR	FUNCTION
DISTANCE-MI	Display distance information as received from the 860E-2 under test.
FLAG	Indicate when the 860E-2 is in the search mode of operation and not locked on.
TEST SET	Indicate when the 578D-1 is receiving power.
CONNECTOR	FUNCTION
PULSE REPLY OUTPUT	Provide modulation for the 235A.
PULSE INTERR INPUT	Accept interrogation pulses from the 235A.
SUPPRESSOR OUTPUT	Supply suppressor output pulses.

578D-1 DME Bench Test Set Controls, Indicators, and Connectors (Sheet 2 of 3)

Figure 1005

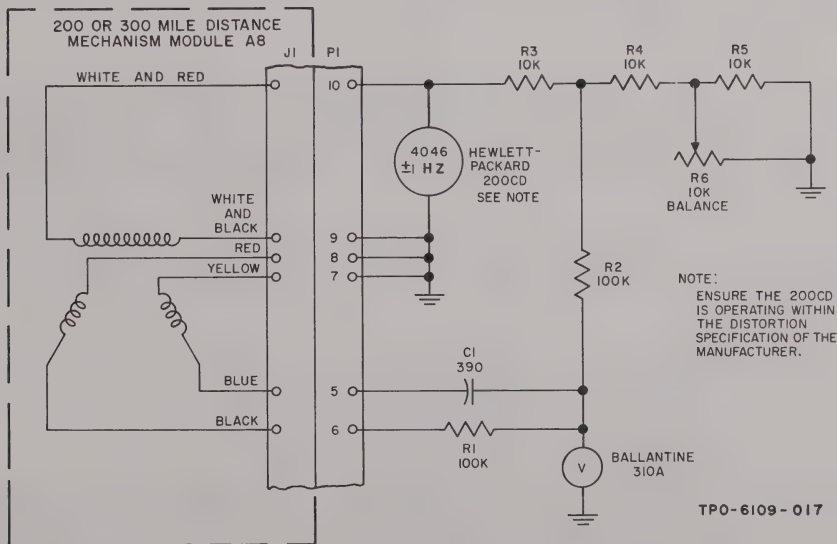


CONNECTOR	FUNCTION
IDENT OUTPUT	Provide tone identification output to headset.
SCOPE CAL OUTPUT	Provide input to oscilloscope during calibration of the 578D-1.
SCOPE SYNC OUTPUT	Provide synchronizing output to oscilloscope during testing of the 860E-1.
R1A, R1B, and R2	Provide access to the potentiometers in the distance mechanism module.

578D-1 DME Bench Test Set Controls, Indicators, and Connectors (Sheet 3 of 3)
Figure 1005

4. DESCRIPTION OF DISTANCE MECHANISM MODULE TEST FIXTURE.

The 200- or 300-mile distance mechanism module test fixture is a locally fabricated test set that may be used to align either the 200- or 300-mile distance mechanism module of the 860E-2. Figure 1006 is a schematic diagram of the test fixture. Figure 1007 is a list of the components used in the test fixture.



Distance Mechanism Module Test Fixture, Schematic Diagram
Figure 1006



OVERHAUL MANUAL

SYMBOL NUMBER	DESCRIPTION	COLLINS PART NUMBER
J1	CONNECTOR: 50 female contacts, Cannon type DDF-50S-1	371-0044-00
R1, R2	MATCHED RESISTORS, FIXED: 100,000 ohms $\pm 1\%$, 1/4 w matched to within 500 ohms	705-7192-00
R3, R4, R5	RESISTOR, FIXED: 10,000 ohms $\pm 10\%$, 1/4 w	745-0785-00
R6	RESISTOR, VARIABLE, LINEAR: 10,000 ohms $\pm 20\%$, 1 w	380-0797-00
C1	CAPACITOR, FIXED, MICA: 390 uuf $\pm 5\%$, 500 vdcw	912-2858-00

Distance Mechanism Module Test Fixture Components
Figure 1007

5. BOONTON 235A NAVIGATION AID TEST SET.

The Boonton 235A Navigation Aid Test Set, used with the 578D-1 DME Bench Test Set, provides calibrated DME test signals on 126 crystal-controlled channels. A front panel view of the 235A is given in figure 1008.

A 235A accepts the r-f interrogation signal from the 860E-2 and, after detection, passes the resulting pulse signal through a front panel connector to the 578D-1 for decoding and reply generation. The pulse reply signal from the 578D-1 then is applied to another front panel connector on the 235A and subsequently modulates the r-f signal generator to provide an r-f reply signal for the 860E-2.

Built-in meter circuitry permits calibration of the modulated output signal for receiver sensitivity measurements of the 860E-2. The same metering circuitry is used to measure the output power of the 860E-2.

Appropriate uhf detectors and associated front panel connector are provided for external monitoring of signals generated by the 860E-2 and the 235A.

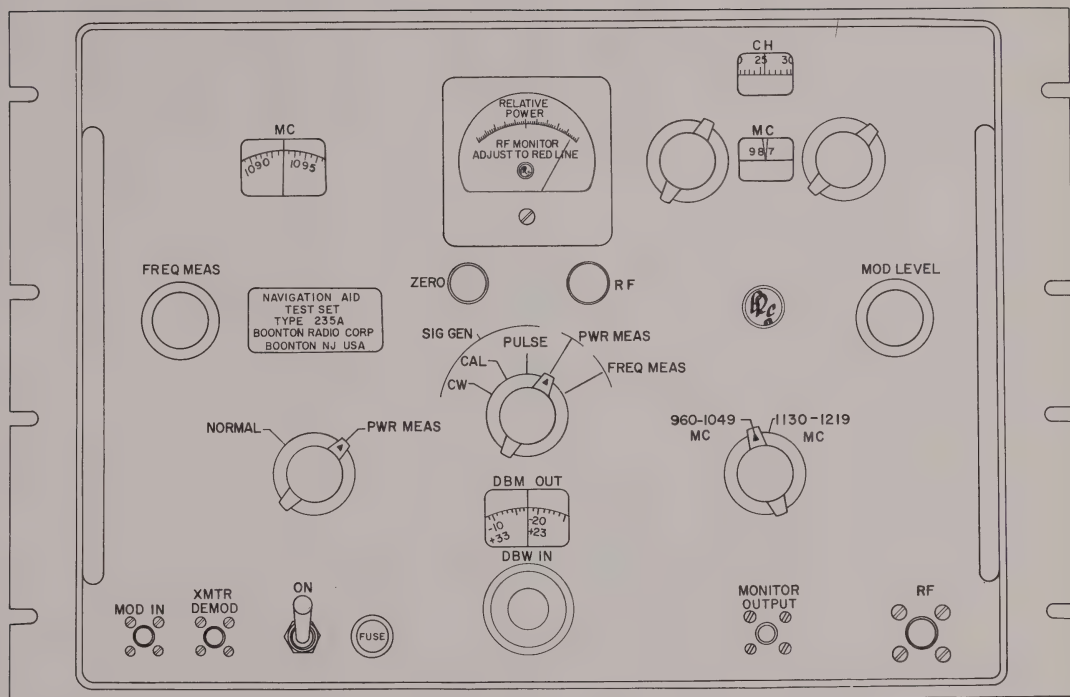
6. DESCRIPTION OF SUBASSEMBLY A2A2 ADJUSTMENT COVER.

Figure 1009 is a template of the cover required to align subassembly A2A2. Because of the accuracy required in the location of the small holes (retaining holes), use the plate from subassembly A2A2 as a guide. Template in figure 1009 can be used to locate the adjustment holes. The adjustment cover (Collins part number 756-9666-001) may be obtained from Collins Radio Company.

April 15/64



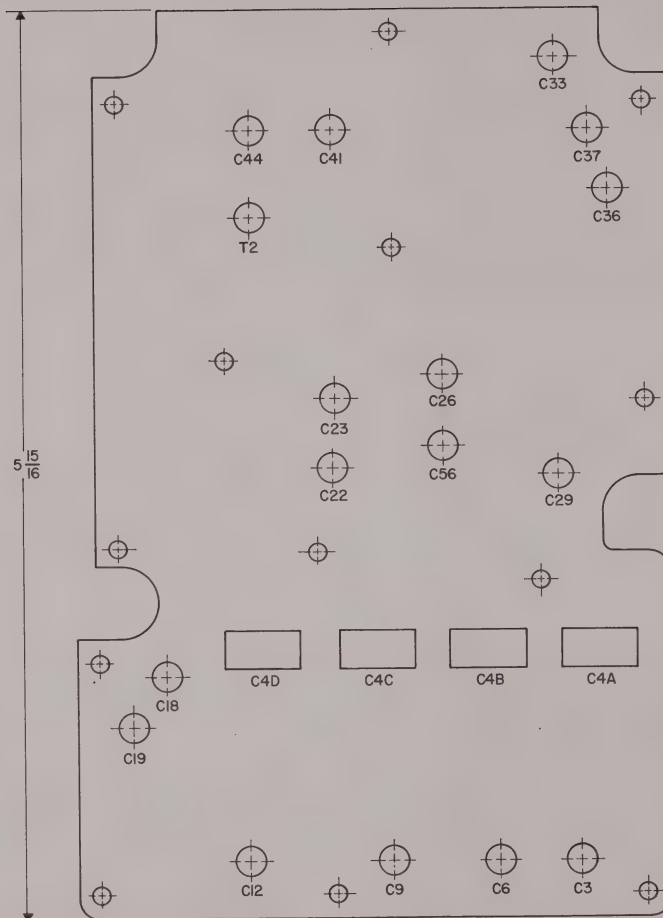
OVERHAUL MANUAL



Boonton 235A Navigation Aid Test Set, Front Panel View
Figure 1008



OVERHAUL MANUAL



- NOTES:
1. $3/16$ HOLE, 17 PLACES.
 2. 0.102 HOLE (NO. 38 DRILL), 13 PLACES.

Adjustment Cover Template
Figure 1009



overhaul manual

(with illustrated parts catalog)

Synchro Resolver

Collins Part Number 229-0246-00
Clifton Precision Type CSH-10-RBGS-6/A031

*This manual is prepared for
Collins Radio Company by
Clifton Precision Products Company.*

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OVERHAUL MANUAL

Record of Revisions

[illegible]

RETAIN THIS RECORD IN THE FRONT OF MANUAL OR CHAPTER.

ON RECEIPT OF REVISIONS, INSERT REVISED PAGES IN THE MANUAL, AND ENTER DATE INSERTED AND INITIALS.



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OVERHAUL MANUAL



CSH-10-RBGS-6/A031
Synchro Resolver
Figure 1



OVERHAUL MANUAL

CSH-10-RBGS-6/A031 Synchro Resolver

1. DESCRIPTION AND OPERATION.

A. General.

This manual provides overhaul instructions and a parts list for the type CSH-10-RBGS-6/A031 Synchro Resolver. See figure 1. The CSH-10-RBGS-6/A031 Synchro Resolver is manufactured by Clifton Precision Products Co., Clifton Heights, Pennsylvania.

B. Description of the Component.

The type CSH-10-RBGS-6/A031 Synchro Resolver consists of a cylindrical housing containing a ball bearing mounted rotor, a brush assembly, and rotor and stator windings. Figure 2 lists component specifications for this component. Figure 3 is a schematic diagram of the CSH-10-RBGS-6/A031.

CHARACTERISTIC	SPECIFICATION
Weight	1.7 oz (average).
Length (not including rotor shaft)	1.319 inches (maximum).
Diameter	0.937 inch (maximum).
Operating temperature range	-55° to +125° C (-67° to +257° F).
Rotor as primary	
Input voltage	9.0 volts rms nominal.
Input frequency	4046 cps nominal.
Input current	2.6 ma.
Input power	0.0065 watt.
Output voltage (stator)	4.5 volts.
Phase shift	2.6 degrees.
Null voltage	20 mv rms (maximum).
Electrical error	20 minutes maximum spread.
Stator as primary	
Input voltage	4.5 volts.
Input frequency	4046 cps nominal.

Table of Component Specifications (Sheet 1 of 2)
Figure 2



OVERHAUL MANUAL

CHARACTERISTIC	SPECIFICATION
Input current	4.6 ma.
Input power	0.0054 watt.
Output voltage (rotor)	8.0 volts.
Phase shift	1.0 degrees.
Null voltage	34 mv rms (maximum).
Electrical error	20 minutes maximum spread.
Rotor d-c resistance	170 ohms.
Stator d-c resistance	24 ohms.
Rotor impedance Z_{rss} (stator shorted)	$270 + j325$ } Measured at $+25^{\circ} \pm 2^{\circ} \text{C}$ with rated excitation, maximum coupling, and zero d-c in winding. Impedance component tolerances are R ($\pm 20\%$) + jX ($\pm 15\%$).
Rotor impedance Z_{ro} (stator open)	
Stator impedance Z_{so} (rotor open)	

Table of Component Specifications (Sheet 2 of 2)
Figure 2

C. Principles of Operation.

The type CSH-10-RBGS-6/A031 Synchro Resolver is a unit which produces voltages on the secondaries which are sine and cosine functions of the voltages supplied to the primaries, depending upon the angular position of the rotor with respect to the stator.

2. DISASSEMBLY.

A. General.

Before disassembly of the CSH-10-RBGS-6/A031, review the exploded view, figure 4, in order to become familiar with each of the parts, the assemblies, and their relationship to each other. Protect disassembled parts from dirt, dust, and moisture.

CAUTION: DO NOT USE FORCE TO REMOVE ANY PART OF THE CSH-10-RBGS-6/A031.

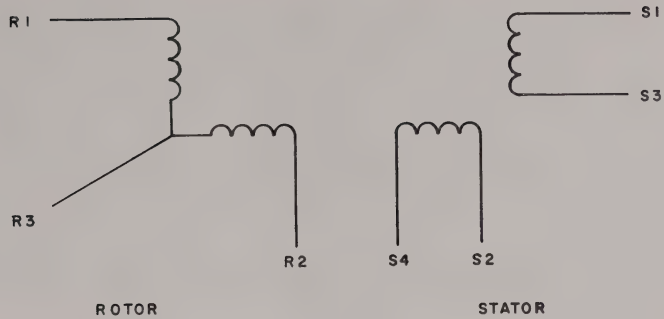
B. Removal of Components.

- (1) Remove screws (2, figure 4) and end plate (1).
- (2) Remove screws (7), cap (3), sleeving (4, 5), and brush block assembly (6).

NOTE: Use a small jeweler-type screwdriver to remove screws (2, 7).



OVERHAUL MANUAL



COLOR CODE:

R1 — RED WITH WHITE TRACER
R2 — YELLOW WITH WHITE TRACER
R3 — BLACK WITH WHITE TRACER
S1 — RED
S2 — YELLOW
S3 — BLACK
S4 — BLUE

CSH-10-RBGS-6/A031 Synchro Resolver, Schematic Diagram
Figure 3



OVERHAUL MANUAL

CAUTION: DO NOT TOUCH BRUSHES DURING BRUSH BLOCK ASSEMBLY REMOVAL. ACID MOISTURE DEPOSITED BY FINGERS WILL CAUSE CORROSION AND PITTING OF THE BRUSH SURFACES.

(3) Remove bearing plate assembly (8) and disassemble as follows:

- (a) Remove retainer (9) using a pair of pointed tweezers.
- (b) Remove washer (10), bearing (11), and washer (12).

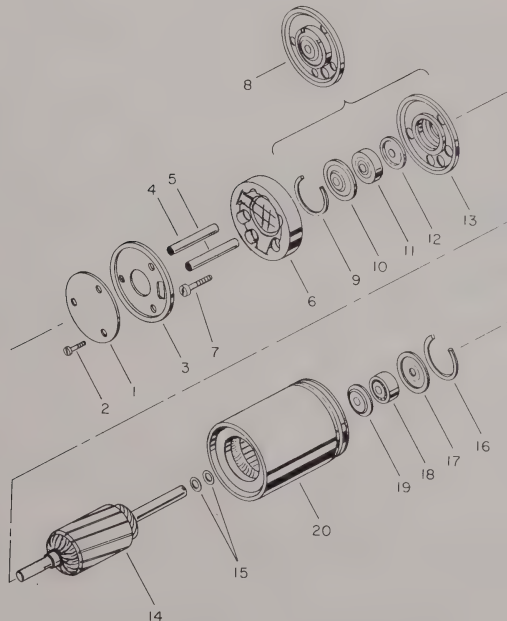
CAUTION: ALWAYS USE TWEEZERS TO PICK UP BEARINGS. ACID MOISTURE DEPOSITED BY FINGERS WILL CAUSE CORROSION.

(4) Carefully remove rotor assembly (14) with shims (15) from housing assembly (20).

CAUTION: DO NOT TOUCH SLIP RINGS ON ROTOR ASSEMBLY. ACID MOISTURE FROM THE FINGERS WILL CAUSE CORROSION AND PITTING.

NOTE: If damage occurs to either rotor assembly or housing assembly, it is recommended that the entire CSH-10-RBGS-6/A031 be replaced.

(5) Remove retainer (16) using a pair of pointed tweezers.



CSH-10-RBGS-6/A031 Synchro Resolver, Exploded View
Figure 4



OVERHAUL MANUAL

- (6) Remove washer (17), bearing (18), and washer (19).

NOTE: Tag bearings (11, 18) to ensure their being installed in the same location upon reassembly.

3. CLEANING.

A. General.

In all cleaning procedures, use solvent cleaning fluid, Federal Specification P-S-661b.

B. Cleaning of Ball Bearings.

- (1) Hold bearing in tweezers and spray with solvent.
- (2) Rotate one of the races slowly to loosen foreign matter from around the balls and separator.
- (3) Dry with warm, filtered air.

CAUTION: CONTINUE DRYING UNTIL BEARING IS ENTIRELY FREE OF CLEANING FLUID. THIS IS EXTREMELY IMPORTANT AS THE SLIGHTEST TRACE OF SOLVENT WILL THIN AND CONTAMINATE THE LUBRICANT.

NOTE: Immediately after cleaning, lubricate bearings as described in paragraph 6.A.

C. Cleaning of Brushes and Rotor Slip Rings.

Spray with solvent cleaning fluid, Federal Specification P-S-661b, and dry with warm filtered air.

CAUTION: DO NOT TOUCH BRUSHES OR ROTOR SLIP RINGS. ACID MOISTURE DEPOSITED BY FINGERS WILL CAUSE CORROSION.

D. Cleaning of Remaining Parts.

Clean remaining parts with solvent cleaning fluid, Federal Specification P-S-661b, and dry with air.

4. INSPECTION/CHECK.

A. Bearings.

- (1) Use a jeweler's loupe in conjunction with a low-power microscope to check bearings.
- (2) Inspect bearings for the presence of foreign matter within or on the bearing races. Inspect for brinelling and cracked or broken balls and separators. Remove discoloration or rust.
- (3) Inspect bearing surfaces on rotor assemblies for roughness or scoring.

B. Inspect brushes for roughness, burring, or pitting on contact areas.

C. Inspect rotor slip rings for corrosion, wear, roughness, burring, or pitting.



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D. Inspect rotor laminations for indication of contact with housing assembly. Check for chipped or cracked surfaces of lamination stack.

E. Inspect insulation, windings, and soldered connections.

5. REPAIR.

Polish out minor scratches on slip rings and shaft of rotor assembly. Remove rusted paint and refinish.

NOTE: It is recommended that the entire CSH-10-RBGS-6/A031 be replaced in preference to either rotor assembly or housing assembly replacement.

Replace all bearings and brushes which fail to pass the inspection procedures given in paragraph 4. Minor brush misalignment can be corrected with tweezers.

6. ASSEMBLY.

A. Lubrication of Bearing.

- (1) Use lubricating oil, Dow Corning DC-510-50CS, which has been checked for contamination.
- (2) Use hypodermic syringe to apply bearing lubricant.
- (3) To guard against lubricant contamination, wash syringe in solvent cleaning fluid, Federal Specification P-S-661b, and dry thoroughly in warm filtered air.
- (4) Lubricate all moving surfaces of bearings.
- (5) Following lubrication, bearings should rotate smoothly with no signs of roughness.

NOTE: Select replacement ball bearings for fit as listed in figure 5.

FIGURE 4, INDEX NO.	NOMENCLATURE	FIT OR CLEARANCE
11, 18	Ball bearing	OD to have a snug press fit in bore of bearing seat. ID to have a light slip fit on rotor shaft. Axial movement in housing to be zero.
14	Rotor assembly	End play 0.0003 to 0.0008 in. Radial play 0.0005 in. (max) Run-out 0.001 in. (max)
6	Brush block assembly	Brush tension to be 1.5 to 2.5 grams (at point of contact)

Table of Fits and Clearances
Figure 5



OVERHAUL MANUAL

B. Assembly.

- (1) Place washer (19) in bearing seat of housing assembly (20).
 - (2) Using tweezers, install bearing (18) in housing assembly.
 - (3) Install washer (17) and retainer (16).
 - (4) Check axial movement of bearing in housing bore.
 - (5) If necessary, disassemble components 16, 17, and 18, and replace washer (19) with a washer of correct thickness to obtain the fit given in figure 5. Reassemble components 16, 17, and 18.
 - (6) Install shims (15) on shaft of rotor assembly (14).
 - (7) Hold housing assembly (20) vertically with mounting flange end up and insert rotor assembly, shimmed end up, into housing assembly and through bearing (18).
 - (8) Invert assembly (mounting flange end of housing assembly down).
 - (9) Install washer (12) in bearing bore of plate (13).
 - (10) Using tweezers, install bearing (11) in plate (13).
 - (11) Install washer (10) and retainer (9).
 - (12) Check axial movement of bearing in plate bore.
 - (13) If necessary, disassemble components 9, 10, and 11, and replace washer (12) with a washer of correct thickness to obtain the fit given in figure 5. Reassemble components 9, 10, and 11.
 - (14) Draw stator leads through hole in bearing plate assembly (8).
 - (15) Install bearing plate assembly (8) on housing assembly (20).
 - (16) Draw stator leads through hole in brush block assembly (6) and place brush block on bearing plate assembly (8).
- NOTE: Spread brushes with tweezers to permit them to slip easily over slip rings of rotor assembly (14).
- (17) Place sleeving (4, 5) over leads and through holes in bearing plate assembly (8) and brush block assembly (6).
 - (18) Attach bearing plate assembly (8) and brush block assembly (6) to housing assembly (20) with screws (7).
 - (19) Check rotor shaft end play and radial play as described in paragraph 8.A. Refer to figure 5 for correct fit.



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- (20) If necessary to adjust end play, disassemble components 7, 6, 4, 5, 8, and 14. Install the correct number of shims (15) to provide the end play given in figure 5. Reassemble components 7, 6, 4, 5, 8, and 14.
- (21) If necessary to correct radial play, disassemble CSH-10-RBGS-6/A031, and check bearings and bearings fits on rotor assembly and in bearing bores. Replace components as required.
- (22) Check that brush tension is within the limits given in figure 5. Use tweezers to adjust, if necessary.
- (23) Draw rotor and stator leads through openings in cap (3) and end plate (1).
- (24) Position cap (3) and end plate (1) on brush block (6) and secure with screws (2).

NOTE: Use a small jeweler-type screwdriver to tighten screws (2, 7).

7. FITS AND CLEARANCES.

Fits and clearances are given in figure 5.

8. TESTING.

A. Mechanical Tests.

Check the CSH-10-RBGS-6/A031 for mechanical defects as follows:

- (1) To check end play of rotor assembly (14, figure 4), apply an axial force of 8 ounces to the rotor shaft. Total indicator reading should be within the limits given in figure 5.
- (2) To check radial play of rotor assembly (14), apply a 4-ounce reverse gauge load to the rotor shaft within 1/8 inch of the end of the shaft. Total indicator reading, measured as close to the bearing as possible, should be within the limits given in figure 5.
- (3) Check friction as follows:

Mount CSH-10-RBGS-6/A031 horizontally in a vibration free test fixture capable of rotating the housing at 1 rpm in either direction. During test, the CSH-10-RBGS-6/A031 shall be electrically unexcited and the shaft shall be elastically restrained. Determine amount of friction by optically measuring shaft deflections while shaft is rotated one complete revolution, first clockwise and then counterclockwise. Temperature should be 25° C (77° F) during test. Friction torque obtained shall not exceed 3 gm-cm.

B. Electrical Tests.

WARNING: THE FOLLOWING TESTS MAKE USE OF HIGH VOLTAGES WHICH ARE DANGEROUS TO LIFE AND MAY BE FATAL IF CONTACTED BY OPERATING PERSONNEL. USE CARE IN WORKING WITH THE EQUIPMENT.

- (1) Dielectric Strength.

Apply a potential of 250 volts (rms) a-c at a frequency of 60 cps between any one of the CSH-10-RBGS-6/A031 windings and the case. The applied potential should be



OVERHAUL MANUAL

raised to the specified value from zero in not less than 5 seconds, and should be applied for 15 seconds. The potential should then be reduced to zero at the same rate as it was increased. The test should be repeated between windings which are insulated from each other but which are on the same iron structure.

CAUTION: DO NOT REPEAT DIELECTRIC STRENGTH TESTS ON AN ASSEMBLED CSH-10-RBGS-6/A031 MORE THAN ONCE AT A VALUE IN EXCESS OF 75 PERCENT OF THE ABOVE SPECIFIED VALUE.

(2) Insulation Resistance.

(a) Use a Megger to apply 500 volts d-c for 1 minute between a lead of the CSH-10-RBGS-6/A031 and the case. The insulation resistance should not be less than 50 megohms.

(b) Repeat step (a) for the other leads of the CSH-10-RBGS-6/A031.

(3) D-C Resistance.

(a) Measure the d-c resistance of the rotor. This resistance should be 170 ohms ± 10 percent, line to line.

(b) Measure the d-c resistance of the stator. This resistance should be 24 ohms ± 40 percent, line to line.

(4) Brush Contact Resistance.

Measure the d-c resistance of the rotor as the rotor is turned through 360 degrees at 3 rpm. This resistance shall not vary more than 1 ohm from the value determined in step (3)(a) while the rotor is turned.

(5) Input Current.

The input current to the CSH-10-RBGS-6/A031, with 9.0 volts, 4046 cps applied to either of the rotor windings, should be 2.6 ma ± 15 percent.

(6) Output Voltage.

The output voltage of the CSH-10-RBGS-6/A031 measured across any two stator leads at maximum coupling position, with the rotor excited as in step (5), should be 4.5 volts ± 8 percent.

(7) Accuracy.

(a) Mount the CSH-10-RBGS-6/A031 in any of the commercially available synchro zeroing test fixtures or some other device which permits the exact indexing of the CSH-10-RBGS-6/A031 from 0 to 360 degrees in precise, calibrated increments.

(b) Zero the CSH-10-RBGS-6/A031.



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1. Connect an a-c vtvm between leads S1 and R1 of the CSH-10-RBGS-6/A031. Jumper lead R3 to S3.
 2. Apply 9.0 volts, 4046 cps to rotor leads R1 and R3 of the CSH-10-RBGS-6/A031.
 3. Set the rotor of the CSH-10-RBGS-6/A031 to zero by setting the calibrated dial of the synchro zeroing test fixture to 0.
 4. Rotate the case of the CSH-10-RBGS-6/A031 to the position that produces the smallest reading on the a-c vtvm.
 5. Without rotating the CSH-10-RBGS-6/A031 shaft or case, remove the a-c vtvm from S1 and R1 and connect from S2 to S4. Remove the jumper from between S3 and R3.
 6. Rotate the CSH-10-RBGS-6/A031 case to the position that produces a null reading on the vtvm. This position is the CSH-10-RBGS-6/A031 zero.
- (c) Connect the stator windings of the CSH-10-RBGS-6/A031 to any of the commercially available synchro bridges or other balanced bridge suitable for measuring the accuracy of the CSH-10-RBGS-6/A031 by the proportional voltage method. The synchro bridge must either contain or have connected to it some type of phase sensitive null detector. Short rotor leads R2 and R4 for this test.
- NOTE: In general, this test conforms to the requirements of paragraph 2.2.6.1.4 of ARP 461A, Aeronautical Recommended Practice, dated 7/1/55 as revised 11/15/59.
- (d) Set the voltage divider on the synchro bridge to 0. Adjust the synchro zeroing test fixture dial until a null is obtained on the null detector of the synchro bridge or on the null detector attached to the synchro bridge. Read the electrical rotor position of the CSH-10-RBGS-6/A031 from the voltage divider of the synchro bridge, which is calibrated in degrees. Compare the electrical rotor position, as read from the voltage divider, with the mechanical rotor position, as read from the calibrated dial of the synchro zeroing test fixture. The difference between these two readings is the CSH-10-RBGS-6/A031 error.
- (e) Check the CSH-10-RBGS-6/A031 error as described in step (d) for rotor positions of 0 to 360 degrees. The error should not be more than 20 minutes of spread (± 10 minutes from the 0 error position).
- (8) Phase Shift.

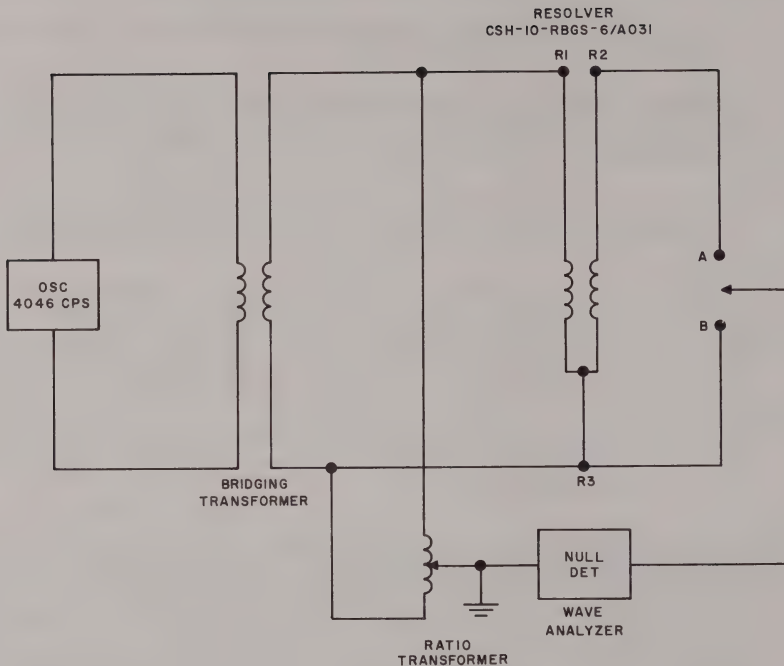
Connect the CSH-10-RBGS-6/A031 as shown in figure 6. Open-circuit the stator leads, and set the rotor at the position of maximum output voltage. It is necessary to use a null detector which rejects all harmonics; a wave analyzer is recommended. Use an isolation transformer between the wave analyzer and the line.

- (a) Phase Shift Variation with Temperature Change.

1. Place the CSH-10-RBGS-6/A031 in a temperature box in which the temperature can be varied from -55°C to $+90^{\circ}\text{C}$. Begin the test at -55°C .



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RECOMMENDED EQUIPMENT:

BRIDGING TRANSFORMER	HEWLETT-PACKARD AC-60B
RATIO TRANSFORMER	GERTSCH MODEL PT-5
WAVE ANALYZER	HEWLETT-PACKARD NO. 300A

Schematic for Phase Shift Measurement Tests,
CSH-10-RBGS-6/A031 Synchro Resolver
Figure 6



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2. With the switch in position A, set the ratio transformer for a null on the null detector. Record the ratio transformer setting and the null voltage.
3. Move switch to position B and adjust the ratio transformer for the same null voltage as in step 2. Record the ratio transformer setting.
4. Divide the ratio transformer setting obtained in step 3 by the one obtained in step 2. This quotient is the tangent of the phase shift angle:

$$\tan \theta = \frac{\text{Setting in step } \underline{3}}{\text{Setting in step } \underline{2}}.$$

5. Repeat steps 2 through 4 as the temperature is increased in 10° increments. The phase shift should be +1.55 ±0.35 degrees over the specified temperature range.

(b) Phase Shift Variation with Input Voltage.

Repeat steps (a)2 through (a)4 above, varying input voltage ±3 db (6.37 to 12.7 volts). The CSH-10-RBGS-6/A031 phase shift variation should not exceed ±0.1 degree.

(c) Phase Shift Variation with D-C Rotor Current.

Repeat steps (a)2 through (a)4 above, varying d-c rotor current from 0 to 12 ma. The resolver phase shift variation should not exceed ±0.1 degree.

(9) Null Voltage.

The null voltage test should be performed as described in paragraph 2.2.7 for Resolver Transmitters of ARP 461A, Aeronautical Recommended Practice, dated 7/1/55 as revised 11/15/59. The null voltage should be 20 mv (rms) maximum, with the unused primary winding shorted.

9. TROUBLE SHOOTING.

Trouble shooting the CSH-10-RBGS-6/A031 may be best accomplished by performing the tests outlined in paragraph 8 of this manual. Refer also to figures 2, 3, 4, and 5.

10. STORAGE INSTRUCTIONS.

Store overhauled CSH-10-RBGS-6/A031 individually in clean, covered, wood or plastic containers containing a desiccant.

11. SPECIAL TOOLS, FIXTURES, AND EQUIPMENT.

All tools, fixtures, and equipment required to test and service the CSH-10-RBGS-6/A031 Synchro Resolver are available commercially from a variety of manufacturers. Various trade names for these equipments are used; the ones chosen in this manual being thought to be best descriptive of the function of the equipment.

A. Synchro Zeroing Test Fixture.

The synchro zeroing test fixture should provide a rigid mount for the CSH-10-RBGS-6/A031 under test. The test fixture should provide exact indexing of the CSH-10-RBGS-6/A031 rotor from 0 to 360 degrees in calibrated increments of no more than 5 degrees. Figure 7 lists some of the commercially available synchro zeroing test fixtures.



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MANUFACTURER	TYPE OR MODEL	DESCRIPTIVE NAME
Bendix	13644-1A	Autosyn angular accuracy tester
Clifton Precision		Angular indexing test stand
Gertsch	DH-5	Divider head
Kearfott	C05 640 2004	Precise angle positioner
Theta	D-4	Precision angular divider

Table of Commercially Available Synchro Zeroing Test Fixtures
Figure 7

MANUFACTURER	TYPE OR MODEL	DESCRIPTIVE NAME	NOTES
Astrosystems, Inc.	A1301R A1301R-CS A1302R A1302R-CS	Synchro bridge	
Kearfott	KT 427771-2A	Synchro bridge	
Theta	RB-11 SSB SRB ST	Synchro bridge	1 1 1
NOTES: 1. May be used to zero CSH-10-RBGS-6/A031 and test for null voltage.			

Table of Commercially Available Synchro Bridges
Figure 8

12. ILLUSTRATED PARTS LIST.

A. General.

This section lists and illustrates all of the procurable assemblies and parts for the CSH-10-RBGS-6/A031 Synchro Resolver. It is not to be taken as the authority for the procedure of assembly or disassembly, but it is intended only for use in requisitioning, storing, issuing, and identifying parts, and illustrating disassembly relationships.



B. FIG. & INDEX NO. Column.

All parts are indexed for easy cross referencing in the exploded view given in figure 4.

C. PART NO. Column.

The part numbers reflect certain drawing information. Part numbers consist of three sections: a one- or two-digit prefix, the basic part number, and a one-digit suffix. Example: 35-1841-02. The first two digits "35" indicate a synchro, the numerals "1841" form the basic part number, and the last digit "2" differentiates between parts or assemblies having the same basic drawing number.

D. NOMENCLATURE Column.

The description is indented under the numbers 1 through 7 to show the relationship of one part or assembly to another part or assembly.

E. USAGE CODE Column.

The USAGE CODE column has been left blank because this manual covers only one model of the component.

F. UNITS PER ASSY. Column.

The number appearing in the UNITS PER ASSY. column is the total quantity of the listed part required in its immediate assembly.

G. Terms and Symbols.

The following terms and symbols are used in the parts list:

ATTACHING PARTS - Those parts used to attach parts or assemblies to the main assembly or to each other. Attaching parts are listed immediately following the assembly or part that they attach.

-----*------ - End of listing of attaching parts and continuation of assembly listing.

AR - Quantity, as required.

NO NUMBER - Not assigned a complete part number.

H. Exploded View Method of Presentation.

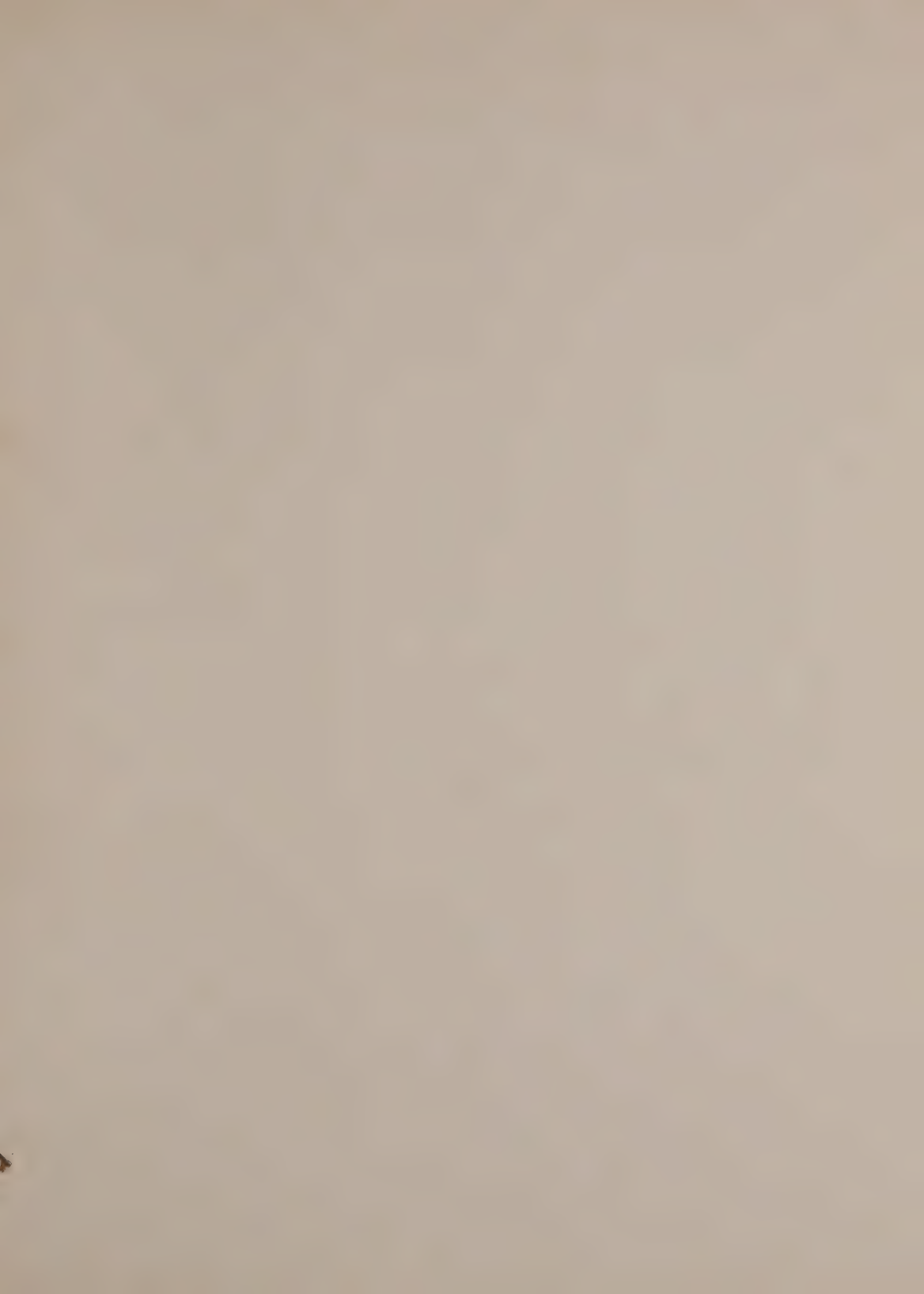
(1) A bracket indicates a breakdown of an assembly of which only the component parts are illustrated. The bracket is assigned the index number of the assembly.

(2) To identify parts with part numbers, first locate the part and its index number in the exploded view. Find the index number in the parts list to determine the part number, nomenclature, disassembly relationship, and the units per assembly.



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FIG. & INDEX NO.	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
4-	35-1854-3	SYNCHRO RESOLVER								1
-3	35-144-3	.	PLATE, End		(ATTACHING PARTS)				1	
-2	35-139-1	.	SCREW		-----*-----				3	
-3	35-1843-3	.	CAP						1	
-4	35-132-1	.	SLEEVING (BLACK)						1	
-5	35-132-2	.	SLEEVING (RED)						1	
-6	35-1883-1	.	BLOCK ASSY, Brush		(ATTACHING PARTS)				1	
-7	35-114	.	SCREW		-----*-----				3	
-8	NO NUMBER	.	PLATE ASSY, Bearing						1	
-9	35-105	.	RETAINER						1	
-10	35-104-2	.	WASHER, Dust						1	
-11	OA-208	.	BEARING						1	
-12	35-108	.	WASHER, Dust		Consists of one each of -1 and one each of -2 (Select)				1	
-13	35-102	.	PLATE, Bearing						1	
-14	35-1824-18	.	ROTOR ASSY						1	
-15	35-121	.	SHIM		Consists of one each of the following parts: -80, -85, -90, -95, -100, -105, -110, -115, -120, -125, -130, -135, -140, -145, -150, -155 (Select at assembly)			AR		
-16	35-105	.	RETAINER						1	
-17	35-104-1	.	WASHER, Dust						1	
-18	OA-200	.	BEARING						1	
-19	35-108	.	WASHER, Dust						1	
-20	35-1834-21	.	HOUSING ASSY						1	





overhaul manual
(with illustrated parts catalog)

Motor-Tachometer Generator

Collins Part Number 229-0264-00

Oster Type 6229-41-01.

*This manual is prepared for
Collins Radio Company by
John Oster Manufacturing Company*

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6229-41-01 Motor-Techometer Generator

ASSIGNED TO (JOB TITLE)

RETAIN THIS RECORD IN THE FRONT OF MANUAL OR CHAPTER.
ON RECEIPT OF REVISIONS, INSERT REVISED PAGES IN THE MANUAL, AND ENTER DATE INSERTED AND INITIALS.



6229-41-01 Motor-Tachometer Generator - Table of Contents

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6229-41-01 Motor-Tachometer
Generator
Figure 1



6229-41-01 Motor-Tachometer Generator

1. DESCRIPTION AND OPERATION.

A. General.

This manual provides overhaul instructions and a parts list for the type 6229-41-01 Motor-Tachometer Generator. See figure 1. The 6229-41-01 Motor-Tachometer Generator is manufactured by the John Oster Manufacturing Company, Racine, Wisconsin.

B. Description of the Component.

The 6229-41-01 Motor-Tachometer Generator consists of a cylindrical housing containing a ball-bearing mounted shaft and two stator windings. The shaft contains separate motor and generator rotor windings. Figure 2 lists specifications for the 6229-41-01. Figure 3 is a schematic diagram of the component.

C. Principles of Operation.

The 6229-41-01 Motor-Tachometer Generator combines both control motor and tachometer generator action. Electrical excitation of the motor causes rotation of the rotor, which actuates the generator section of the unit and produces an electrical signal. The output potential from the tachometer generator is generally fed back to dampen the motor input, to prevent excessive oscillation and to assure high stability in a servo loop. The 6229-41-01 is designed for servo action where instant response to the input signal is essential.

CHARACTERISTIC	SPECIFICATION
Weight	3 ounces
Diameter	0.937 inch
Length (not including rotor shaft)	2.143 inches
Ambient temperature range	-55°C to +125°C
Rotation	Counterclockwise as viewed from shaft end
Rotor inertia	1.09 gm-cm ²
Phase relation	Generator output voltage in phase with input

Table of Component Specifications (Sheet 1 of 2)
Figure 2



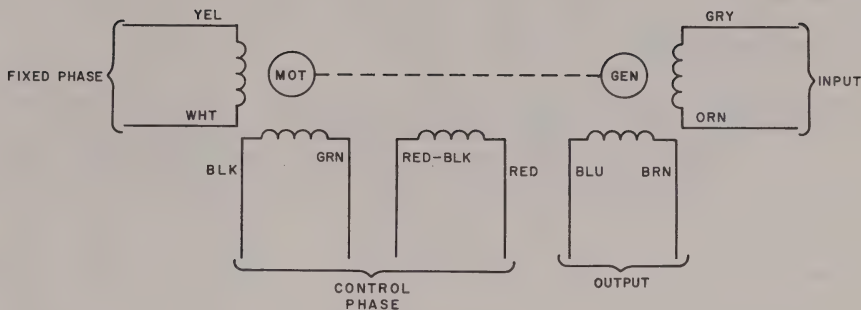
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CHARACTERISTIC	SPECIFICATION
Control motor:	
Phase	Two: control phase leads fixed phase by 90 degrees
Frequency	400 cps
Fixed phase voltage	26 volts
Control phase voltage	36/18 volts
No-load speed	9,500 rpm minimum
Stall torque	0.26 ounce-inch minimum
Fixed phase stall impedance	149 ohms
Control phase stall impedance	286 ohms
Fixed and control phase stall power	3.1 watts
Tachometer generator:	
Input voltage	18 volts
Input frequency	400 cps
Input current	0.208 ampere
Input power	3.5 watts maximum
Input impedance	87 ohms
Output gradient	0.3 volt per 1000 rpm
Output null voltage	0.01 volt maximum
Output wobble voltage	0.008 volt maximum
Output phase shift	1 degree $\pm$ 10 degrees
Output impedance	350 ohms

Table of Component Specifications (Sheet 2 of 2)
Figure 2



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6229-41-01 Motor-Tachometer Generator, Schematic Diagram
Figure 3

2. DISASSEMBLY.

A. General.

Before disassembly of the 6229-41-01 Motor-Tachometer Generator, review the exploded view, figure 4, in order to become familiar with each of the parts, the assemblies, and their relationship to each other.

Do not disassemble parts which are illustrated as assembled in figure 4. Parts which are illustrated in assembled form are considered as inseparable and should be replaced as an assembly. The only exceptions to this are the grommets (12) and the identification plate (1) which are illustrated assembled to the housing, but which are replaceable.

B. Removal of Components.

- (1) Remove spur gear (17) from the rotor extension.

NOTE: The spur gear is a press fit on the rotor extension and must be removed with a gear puller.

- (2) Remove three screws (3) which attach cover (2) to end housing (7) and remove cover.
- (3) Remove lock ring (4) which is threaded into housing (7).
- (4) Tap out end housing (7) and null adjuster (6) containing setscrew (5).
- (5) Remove setscrew (5) from null adjuster (6).



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- (6) Remove disc (8) and shim (9).
- (7) Remove rotor (11), with ball bearings (10) on rotor shaft.
- (8) Remove ball bearings (10) from rotor (11).

CAUTION: DO NOT HANDLE OR OTHERWISE TOUCH BALL BEARINGS WITH BARE HANDS. ACID MOISTURE DEPOSITED BY THE SKIN WILL CORRODE BALL BEARINGS. USE PROPER BEARING HANDLING TOOLS, OR, IF HANDS MUST BE USED, WEAR RUBBER FINGER COTS OR HOLD BEARINGS WITH LENS TISSUE PAPER.

- (9) Remove grommets (12) from housing (16).
- (10) Remove generator stator assembly (13), spacer and shield assembly (14), and motor stator assembly (15) from housing (16).

CAUTION: NO FURTHER DISASSEMBLY OF THE GENERATOR STATOR ASSEMBLY, SPACER AND SHIELD ASSEMBLY, AND MOTOR STATOR ASSEMBLY IS ADVISED.

3. CLEANING.

A. General.

In all cleaning procedures, use solvent cleaning fluid such as trichloroethylene, Federal Specification PS-661b, or naphtha aliphatic, Federal Specification TT-N-95. After cleaning, dry parts with warm air.

B. Ball Bearings.

- (1) Hold bearing in tweezers and spray with solvent.
- (2) Rotate one of the races slowly to loosen foreign matter from around the balls and separator.
- (3) Dry with warm, dry, filtered air.

CAUTION: CONTINUE DRYING UNTIL BEARING IS ENTIRELY FREE OF CLEANING FLUID. THIS IS EXTREMELY IMPORTANT AS THE SLIGHTEST TRACE OF SOLVENT WILL THIN AND CONTAMINATE THE LUBRICANT.

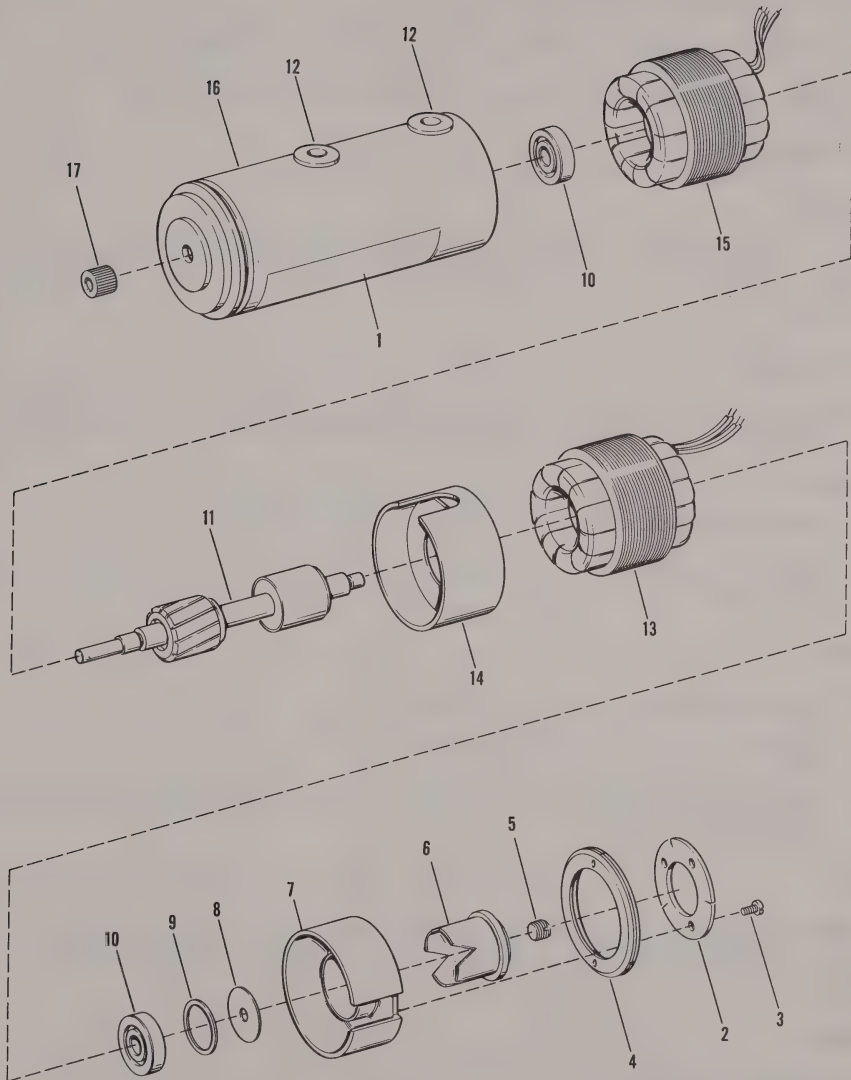
NOTE: Immediately after cleaning, lubricate bearings as described in paragraph 6A.

C. Electrical Parts.

Remove all traces of oil or grease from electrical parts with a clean, lint-free cloth slightly dampened in cleaning solution.



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6229-41-01 Motor-Tachometer Generator, Exploded View
Figure 4



D. Remaining Parts.

- (1) Brush housing with cleaning solution.
- (2) Clean teeth of spur gear with a glass fiber or fine hair brush.
- (3) Clean remaining parts with solvent cleaning fluid and dry with air.

4. INSPECTION/CHECK.

A. General.

After cleaning, inspect all parts of the 6229-41-01 for damage, wear, or other defects. Check components for tightness in assemblies which have not been disassembled. Check screws and lock ring for damaged threads. Refer to paragraph 7 for a listing of wear tolerances.

B. Ball Bearings.

Using a jeweler's loupe in conjunction with a low-power microscope, inspect bearings for out-of-round, scoring, rough operation, and excessive wobble between inner and outer races.

C. Stators.

- (1) Check windings on stators for burned or brittle insulation.
- (2) Check for shorts, opens, or improper resistance values according to the data given in paragraph 8.

D. Rotor.

- (1) Check for loosened rotor cores and cup.
- (2) Check for warped or bent rotor shaft.
- (3) Check spur gear teeth on rotor shaft for nonuniformity of appearance, cracks, breaks, or any malformation.

5. REPAIR.

Any parts or inseparable assemblies of the 6229-41-01 which are found to be defective by inspection procedures should be replaced. Repair is limited to cleaning up damaged screw threads.

6. ASSEMBLY.

A. Lubrication of Bearings.

- (1) Prepare lubricant as follows:
 - (a) Mix 10 grams of light grade silicone grease (figure 5) and 80 cc of silicone oil (figure 5).



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- (b) Heat mixture to 100 degrees centigrade for 1 hour.
- (c) Pour mixture into a blender and mix for 1 minute.
- (d) Check mixture for grease lumps. If any are present, repeat steps b and c until there are no visible lumps.
- (2) After cleaning and drying the ball bearings, relubricate each ball bearing with two drops of lubricant (described above) from a number 26 hypodermic needle.

NOTE: Ball bearings must be selectively chosen for fit in housing and on shaft according to tolerances listed in figure 6.

B. Assembly.

- (1) Insert motor stator assembly (15, figure 4), spacer and shield assembly (14), and generator stator assembly (13) in housing (16).
- (2) Insert grommets (12) in housing (16).
- (3) Insert end housing (7) and secure in place with lock ring (4). Apply red Glyptal (figure 5) to three spots equally spaced on the threads of the lock ring.
- (4) Install ball bearings (10) on rotor (11).
- (5) Insert rotor (11) with bearings into housing (16).
- (6) Insert shim (9) and disc (8) into housing (16).
- (7) Insert null adjuster (6) with setscrew (5). Apply clear Glyptal (figure 5) to the threads of the setscrew and adjust end play according to the tolerances listed in figure 6.
- (8) Place cover (2) in position in lock ring (4) and secure in place to end housing (5) with three screws (3).
- (9) Press spur gear (17) in place on rotor extension. Position on shaft and press fit according to the tolerances listed in figure 6.

DESCRIPTION	SPECIFICATION
Silicone Grease	Dow Corning D.C. 33
Silicone Oil	Dow Corning 200-20
Clear Glyptal	General Electric No. 1276
Red Glyptal	General Electric No. 1201

Table of Approved Lubricants and Sealants
Figure 5



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7. FITS AND CLEARANCES.

Fits and clearances for the 6229-41-01 Motor-Tachometer Generator are listed in figure 6.

FIGURE 4, INDEX NO.	NOMENCLATURE	FIT OR CLEARANCE	
10	Ball Bearing	Housing	0.0001 to 0.0002 in. loose fit
		Rotor Shaft	Handpress to 0.0001 in. loose fit
11	Rotor	End Play	0.003 to 0.006 in. with 1 lb axial load
		Radial Play	0.0010 in. TIR maximum mea- sured 1/8 in. from bearing with 3 oz load applied 1/4 in. from bearing
		Gear Position	0.015 in. maximum from end of shaft, 0.328 to 0.358 in. from same point to housing mounting surface
		Gear Fit	0.0001 in. minimum press fit

Table of Fits and Clearances
Figure 6

8. TESTING.

A. Standard Conditions.

- (1) When pressure and temperature existing at the time of testing are not definitely specified, it shall be understood that tests will be made at atmospheric pressure (approximately 29.92 inches of mercury) and at room temperature (approximately 25°C (77°F)). When tests are made with atmospheric pressure and/or temperature differing materially from the above values, proper allowance shall be made for the different conditions.
- (2) Excitation voltage shall be provided by a 2-phase, 400-cps supply. Voltage amplitude shall be maintained within 1 percent of rated value, and phase angle between phase voltages of fundamental frequency shall be 90 degrees $\pm$ 5 degrees.



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B. Mechanical Tests.

(1) Rotor End Play.

Apply a 1-pound axial load to the rotor shaft. Total indicator reading should be within the limits given in figure 6.

(2) Rotor Radial Play.

Apply a 3-ounce load 1/4 inch from the bearing. Total indicator reading should be within the limits given in figure 6 when measured 1/8 inch from the bearing.

C. Electrical Tests.

WARNING: THE FOLLOWING TESTS MAKE USE OF HIGH VOLTAGES WHICH ARE DANGEROUS TO LIFE AND WHICH MAY BE FATAL IF CONTACTED BY OPERATING PERSONNEL. USE CARE IN WORKING WITH THE EQUIPMENT.

(1) Dielectric Strength.

- (a) Apply a potential of 500 volts (rms) at a frequency of 600 cps between the following leads. The potential shall be raised from zero to the specified value in 10 seconds, held at the value for a period of 15 seconds, and then reduced to zero in 10 seconds. Application of the potential shall cause no breakdown of insulation.

1. White, green, and red of motor to frame.
2. Orange and blue of generator to frame.
3. White, green and red of motor to orange and blue of generator.
4. White of motor to red of motor (tie red-black and green together).
5. Orange of generator to blue of generator.

- (b) Apply a potential of 250 volts (rms) at a frequency of 60 cps between the following leads. The potential shall be raised from zero to the specified value in 10 seconds, held at the value for a period of 15 seconds, and then reduced to zero in 10 seconds. Application of the potential shall cause no breakdown.

1. Red of motor to green of motor.

(2) D-C Resistance.

The d-c resistance of the windings shall be as follows:

(a) Motor.

1. Black to green: 54 $\pm$ 5.4 ohms.
2. Red to red-black: 54 $\pm$ 5.4 ohms.
3. White to yellow: 50 $\pm$ 5 ohms.



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(b) Generator.

1. Orange to gray: $50 \begin{smallmatrix} +8 \\ -5 \end{smallmatrix}$ ohms.

2. Brown to blue : 240 ± 21 ohms.

(3) Direction of Rotation.

(a) Connect the 6229-41-01 motor section as shown in figure 7.

(b) Increase the voltage from zero until the motor runs. The shaft should rotate counterclockwise as viewed from the shaft end.

(4) Single Phasing.

(a) Connect the 6229-41-01 as shown in figure 8, except do not connect the generator section. Operate the motor at no load.

(b) Open the red and black motor phase. The shaft shall coast to a stop within 15 seconds.

(c) Reconnect the red and black motor phase.

(d) After motor attains no-load speed, open the yellow and white motor phase. The motor should stop within 15 seconds.

(5) No-Load Speed.

NOTE: No-load speed must be measured with a stroboscope to prevent loading.

(a) Connect the 6229-41-01 as shown in figure 8, omitting the 100K resistor.

(b) Measure the no-load speed. The no-load speed shall be 9500 rpm minimum.

(6) Starting Voltage.

(a) Apply 26 volts to the yellow and white phase of the motor. Do not connect the generator section. Connect the black and red leads of the motor to a 36-volt, 400-cps source as shown in figure 8.

(b) Slowly increase the voltage on the black and red phase of the motor until the shaft rotates. The motor shall start and run smoothly from any initial rotor position with the voltage on the black and red leads not exceeding 1.0 volt.

(c) Reverse the direction of rotation of the shaft and repeat the test.

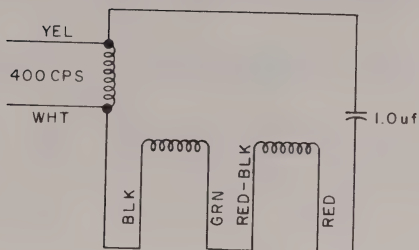
(7) Stall Torque.

(a) Connect the motor section of the 6229-41-01 as shown in figure 8. Do not connect the generator section.

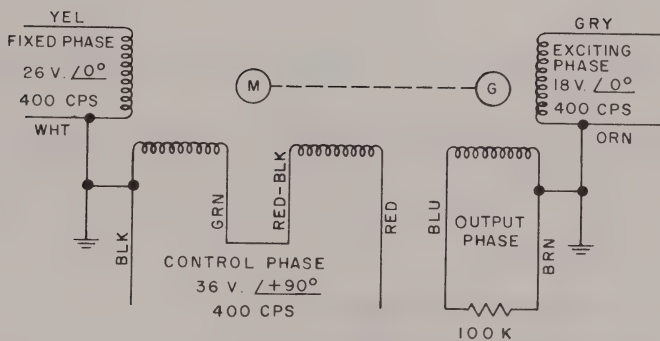
(b) Measure the stall torque. The stall torque shall be 0.26 inch-ounce minimum.



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Rotation Test Schematic
Figure 7



Performance Test Schematic
Figure 8

(8) Stall Power.

- Connect the 6229-41-01 as in step (7)(a).
- Measure the input power at stall. Stall power shall not exceed 3.75 watts per phase.

(9) Generator Null Voltage.

- Apply 26 volts to the white and yellow leads of the motor and 18 volts to the gray and orange leads of the generator as shown in figure 8.



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- (b) Measure the null voltage across the 100K load which is connected across the blue and brown generator leads. The null voltage shall not exceed 0.010 volt.
- (c) Measure the null voltage as the shaft is positioned through 360 degrees. The variation of total null voltage shall not exceed 0.008 volt.
- (d) If it is necessary to set the null voltage to obtain the above limits, loosen screws (item 3, figure 4) and adjust null adjuster (item 6, figure 4). Tighten screws and apply 3 parts of red Glyptal (figure 5) equally spaced between null adjuster and cover (item 2, figure 4) when null voltage is correctly set.

(10) Generator Output Voltage.

- (a) Connect the 6229-41-01 as shown in figure 8. Adjust the control phase voltage (black and red leads) until the shaft is turning at 3600 rpm.
- (b) Measure the output voltage across the 100K resistor. The output voltage shall be 1.15 to 1.35 volts, measured at 3600 rpm.

(11) Generator Polarity.

- (a) Connect the 6229-41-01 as shown in figure 8 so that the shaft rotates counter-clockwise as viewed from the shaft end.
- (b) Determine the phase relation of the output voltage with respect to the input voltage. The output voltage shall be in phase with the excitation voltage, within 1 degree ± 10 degrees.

(12) Generator Input Power.

- (a) Connect the 6229-41-01 as shown in figure 8.
- (b) Measure the power supplied to the generator input phase. The input power shall not exceed 3.5 watts.

(13) Generator Input Current.

- (a) Connect the 6229-41-01 as shown in figure 8.
- (b) Determine the current to the input phase of the generator. The input current shall not exceed 0.220 ampere.

9. TROUBLE SHOOTING.

Refer to figure 9 for assistance in trouble shooting the 6229-41-01 Motor-Tachometer Generator. Possible troubles encountered during testing or before disassembly of a faulty 6229-41-01, along with probable causes and remedies, are listed.



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TROUBLE	PROBABLE CAUSE	REMEDY
Failure of electrical breakdown test.	Grounded stator.	Replace stator.
Excessive rotor shaft end play.	Worn bearings.	Replace bearings.
D-c resistance of stator windings not within limits.	Open or short circuit in windings.	Replace stator.
Reverse rotation.	Fixed or control phase leads reversed.	Correct lead connections.
No-load speed below minimum.	Excessive bearing friction.	Replace bearings.
Starting voltage required is excessive.	Excessive bearing friction.	Replace bearings.
Generator output voltage not within limits.	Defective generator stator.	Replace stator.
Power input excessive.	Defective generator stator.	Replace stator.
Current input excessive.	Defective generator stator.	Replace stator.

Trouble-Shooting Chart
Figure 9

10. STORAGE INSTRUCTIONS.

- A. Place caplug 97408 (not illustrated) on spur gear (17).
- B. Wipe the unit with a clean cloth.
- C. Place the unit in a polyethylene bag.
- D. Cushion the bottom of a suitable corrugated carton with hair cushioning.
- E. Place the unit contained in a polyethylene bag in the carton, and surround with hair cushioning.
- F. Close and tape seal the carton. Label the carton as to content and date of packing.



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NOTE: Units which remain in storage or are inoperative beyond 12 months must be tested, inspected, and relubricated prior to operation.

11. SPECIAL TOOLS, FIXTURES, AND EQUIPMENT.

No special tools, fixtures, or equipment are necessary to overhaul the 6229-41-01 Motor-Tachometer Generator.

12. ILLUSTRATED PARTS LIST.

A. General.

This section lists and illustrates all of the procurable assemblies and parts for the 6229-41-01 Motor-Tachometer Generator. It is not to be taken as the authority for the procedure of assembly or disassembly, but is intended only for use in requisitioning, storing, issuing, and identifying parts, and illustrating disassembly relationships.

B. FIG. & INDEX NO. Column.

All parts are indexed for easy cross referencing in the exploded view given in figure 4.

C. PART NO. Column.

The part number refers to John Oster Manufacturing Company drawing information.

D. NOMENCLATURE Column.

The description is indented under the numbers 1 through 7 to show the relationship of one part or assembly to another part or assembly.

E. USAGE CODE Column.

The USAGE CODE column has been left blank because this manual covers only one model of the component.

F. UNITS PER ASSY. Column.

The number appearing in the UNITS PER ASSY. column is the total quantity of the listed part required in its immediate assembly.

G. Terms and Symbols.

The following terms and symbols are used in the parts list:

--

- Nonillustrated assembly, or assembly which only the component parts are indexed and illustrated.

ATTACHING PARTS

- Those parts used to attach parts or assemblies to the main assembly or to each other. Attaching parts are listed immediately following the assembly or part that they attach.

-----*-----

- End of listing of attaching parts and continuation of assembly listing.



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H. Exploded View Method of Presentation.

- (1) A bracket indicates a breakdown of an assembly of which only the component parts are illustrated. The bracket is assigned the index number of the assembly.
- (2) To identify parts with part numbers, first locate the part and its index number in the exploded view. Find the index number in the parts list to determine the part number, nomenclature, disassembly relationship, and the units per assembly.

FIG. & INDEX NO.	PART NO.	NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
		1 2 3 4 5 6 7		
4-	6229-41-01	MOTOR-TACHOMETER GENERATOR		1
-1	98843	. PLATE - Identification		1
--	209340	. MOTOR AND GENERATOR ASSY		1
-2	41378	. . COVER		1
		(ATTACHING PARTS		
-3	340-120-1001	. . SCREW, Machine		3
		-----*-----		
-4	41376	. . RING - Lock		1
-5	341-210-0001	. . SETSCREW		1
-6	2-659-20001	. . ADJUSTER - Null		1
-7	41375	. . HOUSING - End		1
-8	41381	. . DISK		1
-9	355-122-1520	. . SHIM		1
-10	320-250-0100	. . BEARING - Ball		2
-11	98847	. . ROTOR - Ground		1
-12	41373	. . GROMMET		2
-13	98846	. . STATOR ASSY - Generator		1
-14	209328	. . SPACER AND SHIELD ASSY		1
-15	98845	. . STATOR ASSY - Motor		1
-16	94683	. . HOUSING		1
-17	98849	. GEAR - Spur		1



overhaul manual (with illustrated parts catalog)

DC Motors

Collins Part Number 230-0338-00
Globe Industries Type 41A245

Collins Part Number 230-0390-00
Globe Industries Type 41A330

*This manual is prepared for
Collins Radio Company by
Globe Industries Incorporated.*

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DC Motors, Globe Industries Types 41A245 and 41A330

ASSIGNED TO (JOB TITLE)

[illegible]

ON RECEIPT OF REVISIONS, INSERT REVISED PAGES IN THE MANUAL, AND ENTER DATE INSERTED AND INITIALS.



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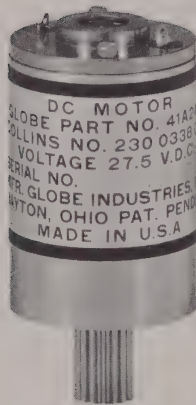
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41A245 DC Motor
Figure 1



OVERHAUL MANUAL

41A245 and 41A330 DC Motors

1. DESCRIPTION AND OPERATION.

A. General.

This manual provides overhaul instructions and a parts list for the 41A245 and 41A330 DC Motors. See figure 1 for the 41A245 DC Motor; the 41A330 is similar in size and appearance but is not identical. The 41A245 and 41A330 DC Motors are manufactured by Globe Industries Incorporated, Dayton, Ohio.

B. Description of the Component.

The d-c motor consists of a cylindrical housing containing (1) rotor windings on a ball-bearing mounted shaft and (2) a permanent magnet mounted as the stator.

Figure 2 lists component specifications for the 41A245 and 41A330. Figure 3 is a schematic diagram of the component. For the specific differences of the 41A245 and 41A330 DC Motors refer to paragraph 12 (illustrated parts list).

CHARACTERISTIC	SPECIFICATION	
	41A245	41A330
Weight	2 oz.	2 oz.
Length	1.375 in. (max)	1.375 in. (max)
Width	0.875 in.	0.875 in.
Nominal voltage	27.5 volts d-c	27.5 volts d-c
Maximum current		
No load	0.08 amp	0.08 amp
Normal rated load	0.14 amp	0.20 amp
Output speed		
No load	-----	10,000 to 12,000 rpm
Normal rated load	9400 to 11,600 rpm	-----

Table of Component Specifications (Sheet 1 of 2)

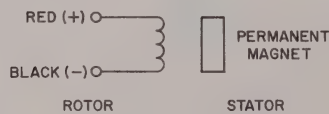
Figure 2



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CHARACTERISTIC	SPECIFICATION	
	41A245	41A330
Normal rated load	0.1 in. oz	0.2 in. oz.
Rotation (viewing shaft end with red (+) and black (-))	Clockwise	Clockwise
Gear data		
Number of teeth	16	16
Diametral pitch	64	64
Pressure angle	20 degrees	20 degrees
Temperature range	-40°C to +100°C (-40°F to +212°F)	-55°C to +72°C (-67°F to +161.6°F)

Table of Component Specifications (Sheet 2 of 2)
Figure 2



41A245 and 41A330 DC Motors, Schematic Diagram
Figure 3

C. Principles of Operation.

The 41A245 and 41A330 DC Motors operate from a 27.5-volt d-c power supply. When the red terminal is positive and the black terminal is negative, rotation is clockwise as viewed from the shaft end.

2. DISASSEMBLY.

A. General.

- (1) Review the exploded view, figure 4, in order to become familiar with each of the parts, the assemblies, and their relationship with each other.



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- (2) Do not disassemble parts which are illustrated as assembled in figure 4. Parts which are illustrated in assembled form are considered inseparable and should be replaced as an assembly.
- (3) Before disassembly, insert the motor into a strong a-c flux field and withdraw it slowly. This will demagnetize the magnet (figure 4, item 21).

B. Removal of Components.

CAUTION: A RECORD OF DISASSEMBLY MUST BE MAINTAINED FOR REASSEMBLY PURPOSES SINCE PARTS AND ASSEMBLIES ARE NOT INDIVIDUALLY MARKED.

- (1) It is not necessary to remove the identification plate (1), but if it should become loose or come off it may be replaced in the reassembly of the unit (paragraph 6.T).

- (2) Remove gear (2) from the rotor extension.

NOTE: The gear is a press fit on the rotor extension and must be removed with a gear puller.

- (3) Remove studs (4) and lift off motor cap (3).
- (4) Remove grommets (5 and 6).
- (5) Lift bearing (7) and washer (8) out of motor cap.
- (6) Remove washers (9, 10, and 11).
- (7) Remove nonmetallic washer (12).
- (8) Remove insulators (13 and 14).
- (9) Remove holder (15), springs (16), terminals (17), and brushes (18).
- (10) Remove shims (19 and 20).
- (11) Remove magnet (21) from housing (27).
- (12) Remove rotor (22) from housing.
- (13) Remove washers (23 and 24) and nonmetallic washer (25).
- (14) Remove bearing (26) from housing (27).

3. CLEANING.

A. General.

In all cleaning procedures use a clean lint-free cloth, a clean soft-bristled brush, and/or moisture-free, filtered, compressed air.



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B. Electrical Parts.

- (1) Clean the components of the motor with a clean lint-free cloth.
- (2) Remove brush dust from the holder (figure 4, item 15) with moisture-free, filtered, compressed air.
- (3) The commutator slots on the rotor (figure 4, item 22) may be brushed clean with a soft-bristled brush.

C. Remaining Parts.

Glyptal enamel may be removed from threaded parts by using thinner 1500 (manufactured by General Electric Co.).

WARNING: USE THINNER IN A WELL-VENTILATED AREA. AVOID PROLONGED INHALATION OF VAPOR AND PROLONGED OR REPEATED CONTACT WITH SKIN. CLEANSE HANDS THOROUGHLY AFTER USING. KEEP AWAY FROM HEAT AND OPEN FLAME.

4. INSPECTION/CHECK.

A. General.

After cleaning, inspect all parts of the 41A245 or 41A330 for damage, wear, or other defects. Check components for tightness in assemblies which have not been disassembled. Check screws and threaded parts for damaged threads.

NOTE: Replace bearings and brushes at every overhaul.

B. Rotor.

- (1) Check rotor for continuity of windings.
- (2) Check insulators on commutator for burns or cracks.
- (3) Check gear for cracked or chipped teeth.

5. REPAIR.

A. General.

Any parts or inseparable assemblies of the 41A245 or 41A330 which are found to be defective by inspection procedures should be replaced. Repair is limited to cleaning up damaged screw threads.

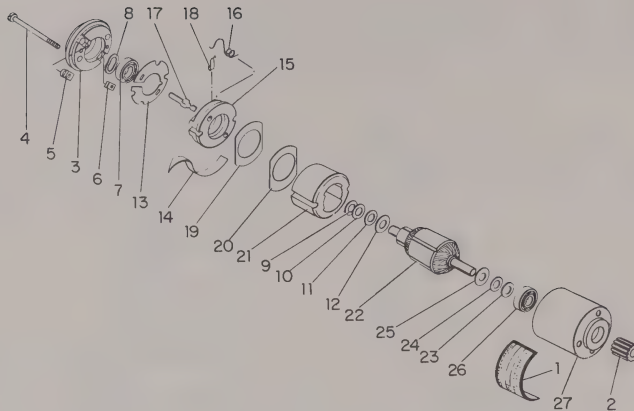
CAUTION: DO NOT MACHINE THE COMMUTATOR OF THE ROTOR (figure 4, item 22).

B. Ball Bearings and Brushes.

Replace the ball bearings (figure 4, items 7 and 26) and brushes (figure 4, item 18) at every overhaul.



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41A245 and 41A330 DC Motors, Exploded View
Figure 4

6. ASSEMBLY.

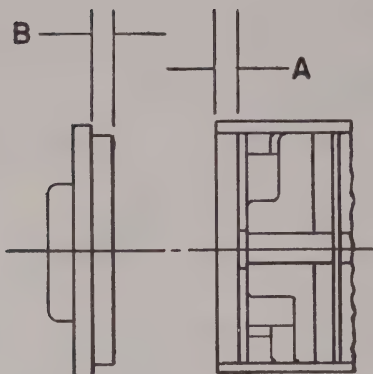
- A. Reassembly is the reverse order of disassembly except where otherwise noted. Refer to item numbers on figure 4 during assembly.

NOTE: Replace the ball bearings and brushes at every overhaul.

- B. Install ball bearing (26) in housing (27) with any suitable installation tool which will seat the bearing by applying force to the outer race only.
- C. Use washers (23, 24, and 25) as required to obtain a 0.370- to 0.380-inch shaft extension from the front face of housing (27).
- D. Place the magnet (21) in the housing (27) with the chamfered edge toward the output end of the unit. During assembly, use a small rod to maintain clearance for studs (4).
- E. Position holder (15) and insulator (13) to determine shims (19 and 20) required so that dimension A (figure 5) is neither less than dimension B (figure 5) nor more than 0.010 inch greater.
- F. Solder all electrical connections using solder, Federal Specification QQ-S-571, Sn60WARP2.
- G. Crimp and solder shunts of brushes (18) in clips provided on terminals (17).
- H. Attach terminals (17) to holder (15) by twisting the rear projection 30 to 45 degrees.



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NOTE:

DIMENSION A MUST BE LARGE AS DIMENSION B, BUT MAY NOT EXCEED DIMENSION B BY MORE THAN 0.01 INCH.

Shimming Diagram
Figure 5

- I. Position springs (16) on posts of holder (15) by using a hooked needle to wind spring 180 degrees in counterclockwise direction.

NOTE: Spring will hook over a portion of the holder and rest in brush slot.

- J. With holder (15) positioned around commutator of rotor (22), install brushes (18) so that the chamfer on brush is facing away from spring (16). Locate spring (16) on brush (18).
- K. Position insulator (14) so that the ends are located approximately 90 degrees from the brushes (18).
- L. Install washer (8) and bearing (7) into cap (3).

NOTE: Do not install grommets (5 and 6) until after rotor shimming is established.

- M. Position cap (3) and use washers (9, 10, and 11) as required until all free end play of rotor (22) is removed.
- N. Install grommets (5 and 6) and position cap (3).
- O. Apply a 5-pound axial load to the output shaft. Washer (8) should compress to produce 0.0003 to 0.010 inch axial movement of rotor (22). If movement is beyond these limits, adjust shimming with washers (9, 10, and 11).

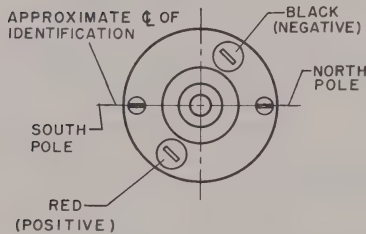


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P. Secure studs (4) with Glyptal enamel 1201B (manufactured by General Electric Co.).

WARNING: USE ENAMEL IN A WELL-VENTILATED AREA. AVOID PROLONGED INHALATION OF VAPOR AND PROLONGED OR REPEATED CONTACT WITH SKIN. CLEANSE HANDS THOROUGHLY AFTER USING. KEEP AWAY FROM HEAT AND OPEN FLAME.

Q. Locate the motor between the pole pieces of a magnetizer so that the radial location of the magnetizer is within ± 5 degrees of the center line through studs (4). Locate the center of the magnetizer pole piece $9/16 \pm 1/16$ inch from the front face of housing (27). Refer to figure 6 for polarity.



Magnetization Orientation
Figure 6

R. Support the commutator end of shaft on rotor (22) and press gear (2) flush with end of shaft.

NOTE: Shaft must not protrude through gear (2).

S. Run-in unit at 24 volts d-c for 24 to 30 hours, or until 75 percent of brush contact area is seated on the commutator. Reverse polarity every 30 minutes to change direction of rotation.

T. Apply trichlorethylene to identification plate (1). Locate on unit (see figure 6) and seal with a hot iron.

WARNING: USE TRICHLORETHYLENE IN A WELL-VENTILATED AREA. AVOID PROLONGED INHALATION OF VAPOR AND PROLONGED OR REPEATED CONTACT WITH SKIN. CLEANSE HANDS THOROUGHLY AFTER USING. KEEP AWAY FROM OPEN FLAME.

7. FITS AND CLEARANCES.

Fits and clearances for the 41A245 and 41A330 DC Motors are listed in figure 7.

FIGURE 4, INDEX NO.	NOMENCLATURE	FIT OR CLEARANCE	
26	Ball bearing	Housing	Press fit
7		Motor cap	Press fit

Table of Fits and Clearances (Sheet 1 of 2)

Figure 7



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FIGURE 4, INDEX NO.	NOMENCLATURE	FIT OR CLEARANCE	
22	Rotor	End play	0.003 to 0.010 with 5 lb axial load.
		Radial play	0.001 in. maximum with 8 oz revers- ing load.
		Gear play	Pressed flush with end of shaft, 0.370 to 0.380 in. from same point to housing mounting surface.

Table of Fits and Clearances (Sheet 2 of 2)
Figure 7

8. TESTING.

A. General.

(1) Standard Condition.

When pressure and temperature existing at the time of testing are not definitely specified, it shall be understood that tests will be made at atmospheric pressure (approximately 29.92 inches of mercury) and at room temperature (approximately 25°C (77°F)). When tests are made with atmospheric pressure and/or temperature differing materially from the above values, proper allowance shall be made for the different conditions.

(2) Testing Procedures.

- Testing procedures given in this manual apply only to components separated from their equipments. These test procedures are considered supplemental to any test procedures given for components installed in their respective equipment. Test procedures for the associated equipment shall take precedence over the following test procedures.
- If testing indicates the motor to be faulty, refer to paragraph 9 (trouble shooting).
- Secure the motor in a suitable mount (laboratory ring stand with an insulated clamp).



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B. Mechanical Tests.

(1) Rotor End Play.

Apply a 5-pound axial load to the rotor shaft. Total indicator reading should be within the limits given in figure 7.

(2) Rotor Radial Play.

Apply an 8-ounce load 1/4 inch from the bearing. Total indicator reading should be within the limits given in figure 7 when measured 1/8 inch from the bearing.

C. Electrical Tests.

(1) Dielectric Strength.

Apply a potential of 600 volts (rms) at a frequency of 60 cps for a period of 1 second from either terminal to the housing.

(2) Direction of Rotation.

(a) Connect the 41A245 or 41A330 as shown in figure 3.

(b) Increase the voltage from zero until the motor runs. The shaft should rotate clockwise as viewed from the shaft end.

(3) Speed.

(a) 41A245 Normal Rated Load Speed.

1. Connect the 41A245 as shown in figure 3 with a 1-oz axial load on the rotor shaft.

2. Measure the normal rated load speed. The normal rated load speed shall be 10,500 $\pm$ 1100 rpm.

(b) 41A330 No-Load Speed.

NOTE: No-load speed must be measured with a stroboscope to prevent loading.

1. Connect the 41A330 as shown in figure 3.

2. Measure the no-load speed. The no-load speed shall be 11,000 $\pm$ 1000 rpm.

9. TROUBLE SHOOTING.

Refer to figure 8 for assistance in trouble shooting the 41A245 and 41A330 DC Motors. Possible troubles encountered during testing or before disassembly of a faulty 41A245 or 41A330, along with probable causes and remedies, are listed.



OVERHAUL MANUAL

TROUBLE	PROBABLE CAUSE	REMEDY
Armature will not rotate.	Armature open. Bent or binding armature. No voltage at terminals.	Replace armature. Replace armature. Check power supply.
Unit runs too fast.	Unit not magnetized correctly.	Refer to paragraph 6Q.
Unit will not come up to speed.	Unit not magnetized correctly.	Reverse the polarity of the power supply rapidly several times.
Unit noisy.	Bearing defective.	Replace bearings.
Brushes sparking or arcing.	Brushes worn or broken. Armature grounded. Brushes sticking in holders. Brushes not seated.	Replace brushes. Replace armature. Free brushes and clean holders. Run-in motor. Refer to paragraph 6S.
Unit draws excessive current.	Armature grounded. Bearing failure.	Replace armature. Replace bearings.

Trouble-Shooting Chart
Figure 8



OVERHAUL MANUAL

10. STORAGE INSTRUCTIONS.

- A. Each unit should be placed in a suitable container to ensure freedom from dust, moisture, and other foreign materials. The motor should be stored with Silica Gel and moisture indicators in a sealed shipping container.

NOTE: Place Silica Gel in bags and wire mesh sleeving or equivalent material to keep desiccant from contacting motor.

- B. Check stored motors periodically. If the moisture indicator has changed color, additional Silica Gel should be added and the container resealed.
- C. Motors stored for long periods of time must be inspected, checked, and tested before being placed in service.

NOTE: Do not disassemble the stored motor unless it is found to be damaged or faulty.

11. SPECIAL TOOLS, FIXTURES, AND EQUIPMENT.

The special equipment required to overhaul the 41A245 and 41A330 DC Motors is listed in figure 9. Any equipment that will perform the requirements of the listed special equipment will be a satisfactory substitute.

MANUFACTURER	TYPE	DESCRIPTION
Radio Frequency Laboratories, Inc.	Model 1221	Laboratory ring stand with an insulated clamp Magnet charger (magnetizer)
Radio Frequency Laboratories, Inc.	Model 889A	Magnetreater (a-c flux field)

Table of Special Equipment
Figure 9

12. ILLUSTRATED PARTS LIST.

A. General.

This section lists and illustrates all of the procurable assemblies and parts for the 41A245 and 41A330 DC Motors. It is not to be taken as the authority for the procedure of assembly or disassembly, but is intended only for use in requisitioning, storing, issuing, and illustrating disassembly relationships.



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B. FIG. & INDEX NO. Column.

All parts are indexed for easy cross referencing in the exploded view given in figure 4.

C. PART NO. Column.

The part number refers to Globe Industries Incorporated drawing information.

D. NOMENCLATURE Column.

The description is indented under the numbers 1 through 7 to show the relationship of one part or assembly to another part or assembly.

E. USAGE CODE Column.

The USAGE CODE column indicates by letter the parts that pertain to each motor discussed in this manual. If no code is given, the part is used in both motors. The code for each motor is as follows:

A -41A245 DC Motor
B -41A330 DC Motor

F. UNITS PER ASSY. Column.

The number appearing in the UNITS PER ASSY. column is the total quantity of the listed part required in its immediate assembly.

G. Terms and Symbols.

The following terms and symbols are used in the parts list:

ATTACHING PARTS - Those parts used to attach parts or assemblies to the main assembly or to each other. Attaching parts are listed immediately following the assembly or part that they attach.

-----*----- - End of listing of attaching parts and continuation of assembly listing.

AR - Quantity as required.

H. Exploded View Method of Presentation.

To identify parts with part numbers, first locate the part and its index number in the exploded view. Find the index number in the parts list to determine the part number, nomenclature, disassembly relationship, and the units per assembly.



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FIG. & INDEX NO.	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
4-	41A245	MOTOR, DC							A	1
	41A330	MOTOR, DC							B	1
-1	17D1940	.	PLATE, Identification						A	1
	17D2085	.	PLATE, Identification						B	1
-2	3D932	.	GEAR							1
-3	34D546	.	CAP, Motor							1
			(ATTACHING PARTS)							
-4	A-1D-611	.	STUD							2
			-----*-----							
-5	B-6D-614-1	.	GROMMET, Red							1
-6	B-6D-614-2	.	GROMMET, Black							1
-7	15D022A022	.	BEARING, Ball, Annular							1
-8	10D695	.	WASHER, Spring							1
-9	A-21D-595-1	.	WASHER							AR
-10	A-21D-595-3	.	WASHER							AR
-11	A-21D-595-2	.	WASHER							AR
-12	A21D543	.	WASHER, Nometallic							1
-13	9D657	.	INSULATOR, Brush							1
-14	A-9D-737	.	INSULATOR, Brush							1
-15	6D613	.	HOLDER, Electrical Contact Brush							1
-16	B-10D-604	.	SPRING, Brush							2
-17	B-32D-562	.	TERMINAL, Motor							2
-18	40D673	.	BRUSH, Motor							2
-19	A-9D-738	.	SHIM							AR
-20	A-9D-656	.	SHIM							AR
-21	B29D513-3	.	MAGNET, Permanent							1
-22	7A984-2	.	ARMATURE, Motor							1
-23	A-21D-595-1	.	WASHER							AR
-24	A-21D-595-3	.	WASHER							AR
-25	A-21D-595-2	.	WASHER							AR
-26	15D022A022	.	BEARING, Ball, Annular							1
-27	4D713	.	HOUSING						A	1
	C-4D-846	.	HOUSING						B	1



illustrated parts catalog

860E-2 Distance Measuring Equipment

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860E-2 Distance Measuring Equipment

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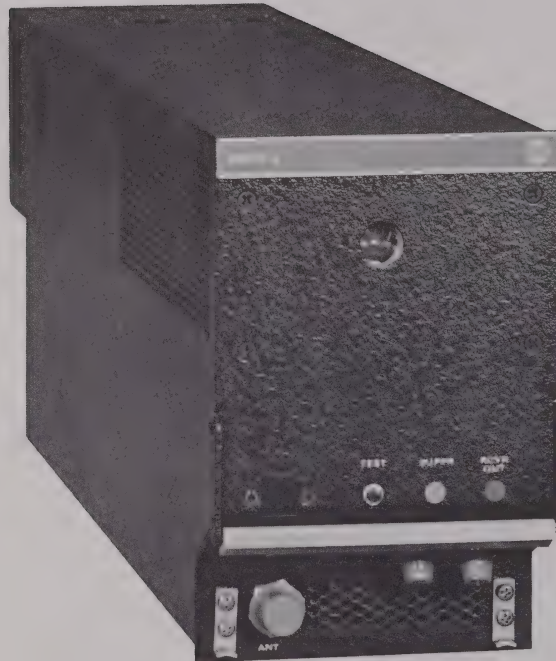
Record of Revisions

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RETAIN THIS RECORD IN THE FRONT OF MANUAL OR CHAPTER.
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860E-2 Distance Measuring Equipment
Figure 1



Cedar Rapids, Iowa 52406

Area Code 319 365-8411

Cable : COLINRAD

June 1, 1967

TO: HOLDERS OF THE 860E-2 DISTANCE MEASURING EQUIPMENT ILLUSTRATED
PARTS CATALOG (523-0755916)

REVISION NO. 6 HIGHLIGHTS

See A page for list of changed pages. Destroy changed pages of the superseded publication, and replace them with the enclosed Illustrated Parts Catalog, Collins Radio Company part number 523-0755916-601115.

TECHNICAL PUBLICATIONS



illustrated parts catalog

860E-2 Distance Measuring Equipment

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ILLUSTRATED PARTS CATALOG

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Section I Introduction

1. GENERAL.

This Illustrated Parts Catalog is a complete list of parts for the following equipment manufactured by Collins Radio Company (see figure 1).

860E-2 Distance Measuring Equipment

For servicing and overhaul, refer to the appropriate manual.

Periodically the Illustrated Parts Catalog is revised to cover additions, deletions, or changes to the equipment. These revisions are indicated by an R placed to the left of each revised line and apply to the current revision only.

2. TABLE OF CONTENTS.

Section II, Table of Contents, contains a list of all sections, locating each section by its page number. The Group Assembly Parts List section is broken down into a list of illustrations giving corresponding figure and page numbers.

3. PARTS LIST INDEXES.

Section III, Parts List Indexes, consists of a Numerical Parts List Index, a Symbol List Index, and a Commercial Hardware List Index.

A. Numerical Parts List Index.

This index contains an alphanumeric list of all parts listed in the Group Assembly Parts List.

(1) PART NUMBER Column.

In this column are listed part numbers for procurable parts and assemblies in the Group Assembly Parts List.

(a) Order of Precedence.

The order of precedence beginning at the extreme left-hand position in part number numerical arrangement is as follows:

Letters A through Z

Numerals 0 through 9 (Alphabetical O's are considered as numerical zeros.)

The order of precedence in continuing the part number arrangement in second and succeeding positions of the part number from left to right is as follows:

Space (blank column)

Diagonal (slant)/



ILLUSTRATED PARTS CATALOG

SECTION I INTRODUCTION

Point (period).
Dash (-)
Letters A through Z
Numerals 0 through 9 (Alphabetical O's are considered as numerical zeros.)

(b) Collins Radio Company Part Numbering System.

The drawing number and part number are identical. A typical number consists of nine or ten digits, divided by dashes into three segments (example: 540-0189-004).

1. The first three digits are the family number. Any family number beginning with 500 through 599 or 755 through 795 (540-XXXX-XXX) is a part peculiar, assembly, or subassembly designed and manufactured by Collins Radio Company. Numbers that do not begin with 500 through 599 or 755 through 795 are purchased parts.
2. The center four digits (XXX-0189-XXX) are assigned in numerical sequence as needed beginning with 0001 and continuing through 9999.
3. The final two or three digits (XXX-XXXX-004) are used to provide separate inventory and stock control over variations of piece parts and assemblies.

(2) FIG.-ITEM Column.

This column lists the Group Assembly Parts List figure and item numbers assigned to the associated part numbers. The figure and item number shown in the Numerical Parts List Index is for the first occurrence of the part only.

(3) QTY Column.

Total quantity of parts or assemblies used in the equipment is listed in this column.

B. Symbol List Index.

The symbol list index enables the user to locate, by symbol, the part number and the figure and item number of any electrical item that appears on the schematic diagram.

(1) SYMBOL Column.

This column contains an alphanumerical listing of all symbolized items. When the same symbol appears in different units or subassemblies, module symbol prefix designators are used. Where no prefix has been assigned, separate indexes will be given. Prefix designators, if required, will be found in paragraph 6.

- (2) Location Column. A road-map location system has been added to aid in locating components on the 860E-2 plug-in boards. In the location column two reference points are shown:

- (a) Vertical (number)
- (b) Horizontal (letter)



These reference points are silk screened on the plug-in boards. For example, to locate C1 on the Distance Pulse Decoder, which has a prefix of A3, locate A3C1 in the symbol index. In the location column to the right of A3C1, you will find 25D. On the Distance Pulse Decoder board find the vertical reference point 25 and the horizontal reference point D. In the area where the two imaginary lines from these reference points cross you will find C1.

(3) Part Number Column.

It gives the Collins part number for all symbolized items.

(4) FIG.-ITEM Column.

This column contains the Group Assembly Parts List figure and item numbers assigned to the reference-designated items. The figure and item numbers are used to locate a part in the Group Assembly Parts List after it has been located in the Symbol List Index.

C. Commercial Hardware List Index.

This index contains a list of all commercially available hardware items used with the equipment and is the total of all commercial hardware items that appear in the Numerical Parts List.

(1) PART NUMBER Column.

Contains Collins part number for all commercial hardware.

(2) NOMENCLATURE Column.

Contains a description of all commercially available hardware including the type of material, dimensions, and type of finish.

(3) QTY Column.

Gives the total quantity of each commercial hardware item used in the entire equipment.

4. GROUP ASSEMBLY PARTS LIST.

A. General.

Section IV, Group Assembly Parts List, consists of a breakdown of the complete unit into subassemblies and detailed parts. Each assembly is listed in its order of disassembly and is followed immediately by its component parts properly indented to show their relationship to the assembly.

(1) FIG.-ITEM Column.

Figure and item numbers key the parts breakdown to the applicable illustration. Items in the parts breakdown preceded by a dash (example -1) do not appear on the illustration.



ILLUSTRATED PARTS CATALOG

SECTION I INTRODUCTION

(2) PART NO. Column.

Part numbers listed are MIL part numbers, vendor part numbers, or Collins part numbers. When more than one part number is available, the preference will be MIL, vendor, and Collins in that order. Vendor part numbers listed in the part number column are subject to change without notice.

(3) Proprietary Items.

Proprietary items are coded P in the part number column.

(4) NOMENCLATURE Column.

In this column are listed each assembly, subassembly, sub-subassembly, a reference to its next higher assembly (NHA), and their attaching parts; attaching parts are listed immediately following the parts which they attach. Items which are made from raw stock, such as cut lengths of wire, solder, varnish, lacing cord, and flexible tubing are not included in the Group Assembly Parts List.

If a part is purchased by Collins Radio Company from a vendor, the Federal Manufacturer's Code number, preceded by the letter V, is listed in this column. The vendor's part number will be listed in the part number column, and the Collins part number will appear in the nomenclature column. If this column does not include a Federal Manufacturer's Code number, the part number listed is a Collins part number. The vendor's name and address are indicated in paragraph 5. Symbol designations, where applicable, will be listed following the Collins part number. Serial number or MCN (manufacturing control number) effectivities, where applicable, are listed following the last item in this column. Serial number effectivities are designated on nameplates. The MCN is stamped on each module and/or chassis. For example, the first module and/or chassis would be stamped MCN 101, the second MCN 102, etc. This Illustrated Parts Catalog reflects changes made by field service bulletins. Notices of such changes are added at the end of the description in the nomenclature column.

(5) USAGE CODE Column.

Part variations within different models of the same equipment are indicated in the usage code column. In cases where this column has been left blank, the part listed will apply to all models of equipment covered by this publication. If usage codes are required, see paragraph 6.

(6) UNITS PER ASSY. Column.

This column lists the quantity of subassemblies or parts required in the next higher assembly. The quantities specified, therefore, are not necessarily the total used per equipment. The letters AR denote that the selection of a part or parts should be made as required. REF refers to an assembly which is completely assembled on a preceding illustration.



ILLUSTRATED PARTS CATALOG

5. VENDORS CODE AND NAME INDEX.

CODE	VENDORS NAME AND ADDRESS	CODE	VENDORS NAME AND ADDRESS
	Bosler Supply 1935 S. Wabash Ave. Chicago, Ill.	03877	Transitron Electronic Corp. 168 Abion Wakefield, Mass.
00222	E S C 534 Bergen Blvd. Palisades Park, N.J.	03998	Cedar Engineering Division of Control Data Corp. Minneapolis, Minn.
00287	Connecticut Engineering and Mfg. Co. 24 School St. Danielson, Conn.	04435	Jettron Products, Inc. 56 Rt. 10, Box 274 Hanover, N. J.
00656	Aerovox Corp. 740 Belleville Ave. New Bedford, Mass.	04713	Motorola, Inc. Semiconductor Products Division 5005 E. McDowell Rd. Phoenix, Ariz.
00853	Sangamo Electric Co. Pickens Division Pickens, S.C.	05397	Kemet Co. 11901 Madison Ave. Cleveland, Ohio
01121	Allen-Bradley Co. 136 W. Greenfield Ave. Milwaukee 4, Wis.	05982	Moffats, Ltd. Weston, Ontario, Canada
01281	Pacific Semiconductors, Inc. 10451 W. Jefferson Blvd. Culver City, Calif.	06001	Capacitor Department General Electric Co. Irmo, South Carolina
01341	Microphase Corp. P.O. Box 1166 Greenwich, Conn.	06751	Nuclear Corporation of America, Inc. V.S. Semcor Division 3540 W. Osborn Rd. Phoenix, Ariz.
01526	Specialty Control Dept. General Electric Co. Waynesboro, Va.	06773	Timber Tap, Inc. 199 N. Main St. Freeport 10, N. Y.
01939	Sprague Electric Co. of Wisconsin 1146 Sixth Ave. Grafton, Wis.	06978	Aladdin Electronics Division of Aladdin Industries, Inc. 715 Murfreesboro Rd. Nashville, Tenn.
02335	Fairchild Controls Corp. 225 Park Ave. Hicksville, L.I., N.Y.	07263	Fairchild Camera and Instrument Corp. Semiconductor Division 545 Whisman Rd. Mountain View, Calif.
03038	Long-Lok Corp. 2601 Colorado Ave. Santa Monica, Calif.	07388	Torotel, Inc. 5512 East 110th St. Kansas City 34, Mo.

July 1/66



CODE	VENDORS NAME AND ADDRESS	CODE	VENDORS NAME AND ADDRESS
07966	Shockley Semi-Conductor Laboratories Palo Alto, Calif.	19701	Electra Mfg. Co. Independence, Kans.
08127	Precision Mechanisms Corp. 44 Brooklyn Ave. Westbury (Long Island), N.Y.	21242	American Electronics Components Corp. P.O. Box 27087 Cincinnati, Ohio
08281	Richards Electrocraft, Inc. Chicago, Ill.	21520	Fansteel Metallurgical Corp. 2200 N. Sheridan N. Chicago, Ill.
08664	Bristol Co., The P.O. Box 1790 Waterbury 20, Conn.	25140	Globe Industries, Inc. 1900 Stanley Ave. Dayton 4, Ohio
09250	Electro Assemblies, Inc. 444 N. Kedzie Ave. Chicago, Ill.	30817	Instrument Specialities Co., Inc. 254 Bergen Blvd. Little Falls, N.J.
09922	Burndy Corp. Norwalk, Conn.	33173	General Electric Co. Tube Dept. 316 East 9th St. Owensboro, Ky.
10646	Carborundum Co. Dept. EM-2R Niagara Falls, N.Y.	37480	Machlett Laboratories, Inc. 1063 Hope St. Springdale, Conn.
12014	Chicago Rivet and Machine Co. 950 S. 25th Ave. Bellwood, Ill.	37942	Mallory, P.R., and Co., Inc. 80 S. Gray St. Indianapolis, Ind.
12040	National Semiconductor Corp. P.O. Box 443 Danbury, Conn.	40920	Miniature Precision Bearings, Inc. Precision Park Keene, N.H.
12360	Albany Products Co. South Norwalk, Conn.	44655	Ohmite Mfg. Co. 3601 Howard St. Skokie, Ill.
12615	US Terminals, Inc. 7508 Camargo Rd. Cincinnati 43, Ohio	46384	Penn Engineering and and Mfg. Corp. Old Easton Highway Doylestown, Pa.
14370	Continental Rubber Works 1953 Liberty Ave. Erie 6, Pa.	53021	Sangamo Electric Co. 1207 N. Eleventh St. Springfield, Ill.
14655	Cornell-Dubilier Electric Corp. Delancy St. Newark, N.J.		
15909	Daven Co. 530 W. Mt. Pleasant Ave. Livingston, N. J.		
19315	Bendix Corp., The Eclipse-Pioneer Div. Teterboro, N.J.		

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CODE	VENDORS NAME AND ADDRESS	CODE	VENDORS NAME AND ADDRESS
56289	Sprague Electric Co. 481 Marshall St. North Adams, Mass.	70417	Amplex Division of Chrysler Corp. P.O. 2718 Detroit 31, Mich.
57771	Stimpson, Edwin B., Co., Inc. 74 Franklin Ave. Brooklyn 5, N.Y.	70485	Atlantic India Rubber Works, Inc. 571 W. Polk St. Chicago 7, Ill.



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CODE	VENDORS NAME AND ADDRESS	CODE	VENDORS NAME AND ADDRESS
70674	A D C Products Div of Magnetic Controls Co. 6411 Cambridge St. Minneapolis 26, Minn.	75543	Lavelle Rubber Co. 424 N. Wood St. Chicago 22, Ill.
70854	Borden Corp. 248 Park Ave. Danbury, Conn.	75915	Littelfuse, Inc. 1865 Miner St. Des Plaines, Ill.
71034	Bliley Electric Co., Inc. 200 Union Station Bldg. Erie, Pa.	76487	Millen, James, Mfg. Co., Inc. 150 Exchange St. Malden 48, Mass.
71400	Bussmann Mfg. Div of McGraw-Edison Co. University at Jefferson St. Louis 7, Mo.	76854	Oak Mfg. Co. Electronic Components 200 E. Crystal Lake Ave. Crystal Lake, Ill.
71468	Cannon Electric Co. 3208 Humboldt St. Los Angeles 31, Calif.	77045	Oster, John Mfg. Co. 1 Main St. Racine, Wis.
71785	Cinch Mfg. Co. Division of United-Carr Fastener Corp. 4258 N. Cicero Ave. Chicago 47, Ill.	77147	Patton MacGuyer Co. 17 Virginia Ave. Providence 5, R.I.
72136	Electro Motive Mfg. Co. S. Park and John Sts. Willimantic, Conn.	77250	Pheoll Mfg. Co. 5700 Roosevelt Rd. Chicago 50, Ill.
72962	Elastic Stop Nut Corp. of America 2330 Vauxhall Rd. Union, N.J.	78189	Shakeproof Division of Illinois Tool Works St. Charles Rd. Elgin, Ill.
72982	Erie Resistor Corp. 644 W. 12th St. Erie, Pa.	78818	Truscott Boat and Dock Co. St. Joseph, Mich.
73293	Hughes Products Division of Hughes Aircraft Co. 500 Superior Ave. Newport Beach, Calif.	78488	Stackpole Carbon Co. St. Marys, Pa.
73899	J F D Electronic Corp. 6101 16th Ave. Brooklyn, N.Y.	79136	Waldes Kohinoor, Inc. 47-16 Austel Place Long Island City, N.Y.
75042	International Resistance Co. 401 N. Broad St. Philadelphia 8, Pa.	79807	Wrought Washer Mfg. Co. 2252 S. Bay St. Milwaukee 7, Wis.
		79963	Zierick Mfg. Corp. Beechwood and Rockdale Ave. New Rochelle, N.Y.

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CODE	VENDORS NAME AND ADDRESS	CODE	VENDORS NAME AND ADDRESS
80223	United Transformer Co. 150 Varick St. New York 13, N.Y.	89462	Waldes Kohinoor, Inc. Cambridge, Mass.
80294	Bourns Laboratories, Inc. 1200 Columbia Ave. Riverside, Calif.	91146	Cannon Electric Co. Salem Division Pingree and Leavitt Sts. Salem Mass.
81073	Grayhill, Inc. 569 Hillgroove Ave. La Grange, Ill.	91506	Augat, Inc. 33 Perry Ave. Attleboro, Mass.
81851	Bentley Harris Mfg. Co. 1300 Barclay St. Conshohocken, Pa.	91637	Dale Electronics, Inc. 1370 28th Ave. Columbus, Neb.
82227	Haydon, A.W. Co. 247 N. Elm St. Waterbury, Conn.	91662	Elco Corp. Willow Groove, Pa.
82577	Hughes Aircraft Co. Bldg. 6 M.S.D. Florence & Teale Sts. Culver City, Calif.	91663	Armel Electronics, Inc. Brooklyn, N.Y.
82877	Rotron Mfg. Co., Inc. Hasbrouck Lane Woodstock, N.Y.	91767	Heli-Coil Corp. Shelter Rock Lane Danbury, Conn.
85675	Midland Mfg. Co. 3155 Fiberglass Rd. Kansas City 15, Mo.	91929	Minneapolis-Honeywell Regulator Co. Micro Switch Division Chicago and Spring Sts. Freeport, Ill.
86197	Clifton Precision Products Co. Marple at Broadway Clifton Heights, Pa.	91984	Maida Development Co. 214 Academy St. Hampton, Va.
96577	Precision Metal products of Malden, Inc. 41 Elm St. Stoneham 80, Mass.	93983	Van Norman Industries, Inc. Electronics Division Manchester, N.H.
88063	Communication Accessories Co. U.S. Hwy 50 & 71 B-Pass Lees Summit, Mo.	95712	Dage Electric Co., Inc. 67 N. 2nd St. Beech Grove, Ind.
88245	U.S. Engineering Co. 13536 Saticoy St. Van Nuys, Calif.	96095	Hi-Q Division of Aervox Corp. Seneca Ave. Box 493 Olean, N.Y.
88818	Kearfott Division of General Precision, Inc. Little Falls, N.J.	96214	Texas Instruments, Inc. Apparatus Division Box 6015 Dallas 22, Tex.
		96341	Microwave Associates, Inc. Northwest Industrial Park Burlington, Mass.

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CODE	VENDORS NAME AND ADDRESS	CODE	VENDORS NAME AND ADDRESS
96881	Thomson Industries, Inc. New Hyde Park, L.I. N.Y.	99017	Protective Closures Co., Inc. CA Plugs Div 2207 Elmwood Ave. Buffalo 23, N.Y.
97315	Ballastran Corp. 1701 N. Calhoun St. Ft. Wayne, Ind.	99378	Atlee Corp. 2 Lowell Ave. Winchester, Mass.
97965	Stancor Electronics, Inc. 3501 W. Addison St. Chicago 18, Ill.	99800	Delevan Electronics Corp. 270 Quaker Rd., Dept. EE3 E. Aurora, N.Y.
98291	Sealectro Corp. 139 Hoyt St. Mamaroneck, N.Y.	NOTE:	This list does not include Vendor 13499, Collins Radio Company, Cedar Rapids, Iowa. This code will not appear in Section II, Group Assembly Parts List.
98330	Polyphase Instrument Co. E. Fourth St. Bridgeport, Pa.		

6. TABLE I.

A. USABLE ON CODES. The following codes have been assigned in this manual:

USE ON CODE	UNIT	FIGURE
A	860E-2 522-2702-011	1
B	860E-2 522-2702-014	1
C	860E-2 522-2702-052	1
D	860E-2 522-2702-053	1
E	860E-2 522-2702-054	1
F	860E-2 522-2702-056	1
G	Cathode Assy 554-6328-004	1
H	Cathode Assy 554-1952-004	1
J	Cathode Assy 554-1951-004	1

B. REFERENCE DESIGNATION PREFIXES.

The following prefixes have been assigned in this manual:

PREFIX	UNIT	FIGURE
A1	Power Supply	21
A2	Radio Receiver-transmitter	9
A2A1	Channel Selector	14
A2A2	Frequency Multiplier Amplifier	13
A2A3	R-F Amplifier	18
A2A4	Pulse Modulator	10
A2A5	Preselector	12
A2A6	I-F Amplifier	11
A3	Distance Pulse Decoder	6
A4	Distance time Base Generator	8
A5	Distance Interrogation Generator	7
A6	Search track Electronic Switch	5
A7	Electronic Control Amplifier	2
A8	Distance Mechanism	3



ILLUSTRATED PARTS CATALOG

SECTION I
INTRODUCTION

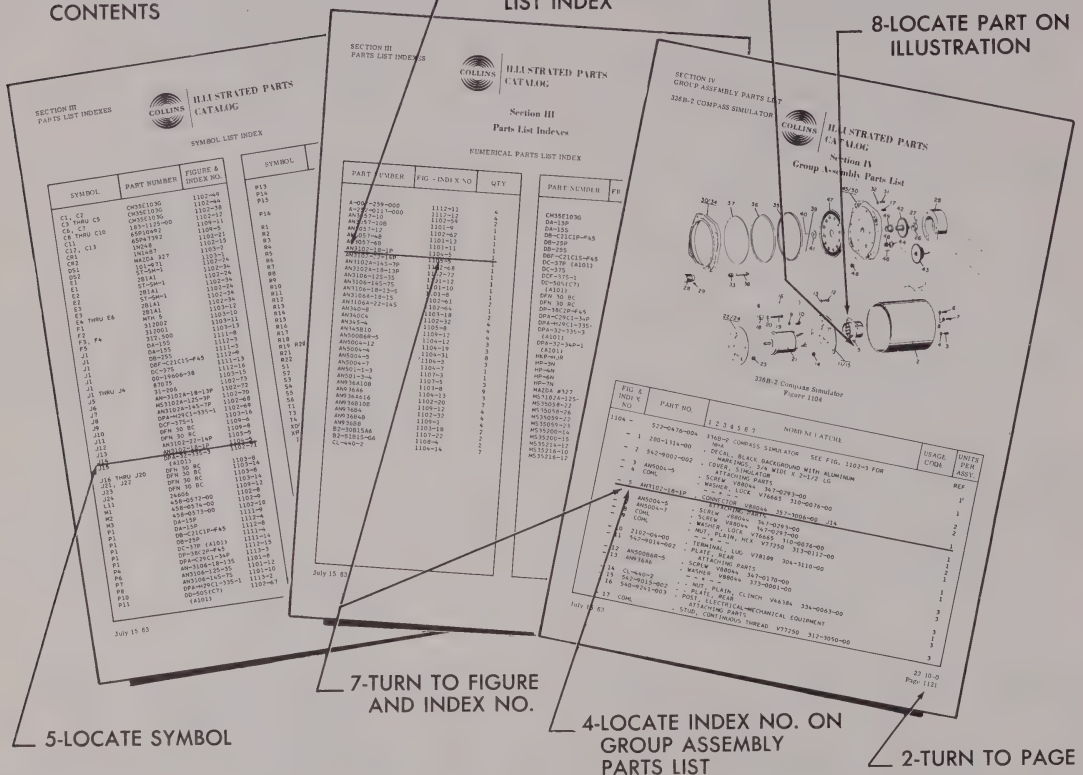
How to Use This Illustrated Parts Catalog

1-FIND PAGE NO.
IN TABLE OF
CONTENTS

6-FIND PART NO. IN
NUMERICAL PARTS
LIST INDEX

3-FIND PART AND
ITS INDEX NO.

8-LOCATE PART ON
ILLUSTRATION



HOW TO FIND THE PART NUMBER IF THE SECTION OR SYSTEM OF THE EQUIPMENT IN WHICH THE PART IS USED IS KNOWN:

- (1) Turn to the Table of Contents and find the page number for the Major Assembly or System in which the part is used.
- (2) Turn to the page determined in step (1).
- (3) Locate the part and its index number on the illustration.
- (4) Find the index number on the Group Assembly Parts List page to determine complete description.
- (5) If the reference designation symbol is known, refer to the Symbol List Index to find the part number.

HOW TO FIND THE ILLUSTRATION FOR A PART IF THE PART NUMBER IS KNOWN:

- (6) Refer to the Numerical Parts List Index and find the part number.
- (7) Turn to section IV and find the first figure and index number indicated in the Numerical Parts List Index for that part. If this figure shows the part in a section or system of the equipment other than the one desired, refer to the other figure numbers listed in the Numerical Parts List Index.
- (8) On the face of the illustration, find the index number determined in step (7).



Section II

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	(160-0007-929X)	7 97
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	(160-0007-925X)	8 107
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	(C944-48-4), (160-0007-906X)	13 133
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	(160-0007-913X), (160-0007-918X).	14 143
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Section III
Parts List Indexes

PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ	PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ
AA226-3MILL6085		3-63	1			16-29	1
AA309-3MILL6085A		12-30	1			16-34	1
AB396-1		9-14	1			16-36A	1
		10-45	1	CK60AW681M		13-30	1
		14-60	5			13-114	1
		21-96	3	CK60AW821M		13-106	1
AB397-2		23-146	1	CK63AW103M		5-103	1
AFRH10KF328		23-126	1			5-106	1
AY523-46A1		3-124	1	CL21CH4R5TP3		22-11	1
A0-19046		21-15	1	CL21CJ030TP3		5-57	1
A11593		14-44	1	CL23CJ1R5TN3		22-39	1
A12527		21-76	1	CL25BG100UP3		6-101	1
A140406-14		12-72	3			7-150	1
A14352		6-115	1	CL25BG400UP3		6-93	1
A25H0TTINNED		11-173	1	CL25BJ180UP3		6-119	1
A309-9MILL6085		12-18	2			6-123	1
A7575		10-51	2	CL27BE100UN3		5-5	1
		11-172	8	CL27BJ100TN3		7-13	1
		14-62	5	CL31CH1R5MP3		22-18	1
		16-41	4	CL37BL020MN3		2-31	1
		22-48	6			2-32	1
BC3236A		21-19	1	CL37BQ010MN3		7-67	1
BC3237A		21-20	1	CM05C120K03		11-29	1
BC3238		21-18	1	CM05C180K03		11-52	1
BC3246		21-79	1	CM05E200J03		11-55	1
CAVITY ASSY		13-2A	1			11-126	1
CC20CH180J		16-11	1			11-131	1
CC22SH120J		13-77	1	CM05E270J03		13-46	1
		13-80	1	CM05E300J03		13-25	1
		13-82	1	CM05E390J03		11-49	1
		13-84	1			11-125	1
CD19F332F03		7-157	1			11-137	1
CD19F432F03		8-85	1	CM05E470J03		11-58	1
CD19F472F03		8-65	1			13-46	1
CD5900		13-6	1	CM05E560J03		11-28	1
CG10LCJS03A9		23-106	1	CM05E680J03		11-62	1
15						11-134	1
CG10LCJS03A9		23-122	1	CM05E750J03		13-101	1
15				CM05F101J03		2-105	1
CG10LCJS03A9		23-139	1			2-149	1
15						8-120B	1
CK60AW102M		11-61	1			11-35	1
		11-67	1			11-41	1
		11-135	1			11-58	1
		15-54A	1			11-134	1
		16-7	1			13-44	1
		16-13	1			13-133	1
		16-22	1			13-145	1
		16-25	1			16-3	1
						16-4	1
						16-17	1



ILLUSTRATED PARTS CATALOG

SECTION III
PARTS LIST INDEXES

NUMERICAL INDEX

PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ	PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ
CM05F121J03		13-101	1	CR76U36-13700MC		15-39	1
CM05F151J03		6-198	1	CR76U36-55370MC		15-38	1
		13-78	1	CR76U36-97040MC		15-37	1
CM05F181J03		5-30	1	CR76U37-38700MC		15-36	1
CM05F220J03		7-125A	1	CR76U37-80370MC		15-35	1
		11-23	1	CSH10RCLS6A9		23-140	1
CM05F221J03		6-2	1	48			
		6-49	1	CS402-2-54		23-110	1
		6-58	1	CS402-3-54		23-110	1
		6-89	1	DAF15SC33		21-37A	1
		6-102	1	DAF15SC7		18-162	1
		6-153	1	DA15PC7		10-33	1
		7-22	1	DA718-001		13-116	1
		8-69	1			13-117	1
		8-144	1			13-119	1
		11-61	1	DBF25SC7		21-40	1
		16-20	1			21-41	1
CM05F241J03		6-130	AR			21-42	1
		6-131	AR			21-43	1
		7-82A	1	DB25PC7		5-32	1
CM05F331J03		16-5	1			6-145	1
CM05F391G03		8-6	1			7-30	1
		8-137	1			8-150	1
		8-142	1	DCF37SC7		21-38	1
CM05F391J03		6-10	1			21-44	1
		7-80	1	DC37PC7		2-26	1
		11-107	1			14-17	1
CM06F102J03		6-130	AR	DDF50SC7		21-48	1
		6-131	AR	DD50PC7		3-13	1
CM06F152J03		7-162	1			23-19	1
CM06F182J03		7-144	1	DEF9SC7		18-158	2
CM06F222J03		10-24A	1	DE9PC7		11-4	1
CM06F242J03		5-211	1			13-111	1
CM06F272G03		5-209	1	DL107		8-18	1
CM06F472J03		7-58	1			8-26	1
CM06F511J03		5-169	1			8-49	1
CM06F561J03		11-12	1			8-63	1
CM06F751J03		6-130	AR			8-82	1
		6-131	AR	DL108		8-36	1
CM06F821J03		5-105	1	DL644		8-67	1
		7-109	1	DM10F101J		5-203	1
CM07F103J03		2-48	1	DM10F331J		7-73A	1
		7-73	1			11-120	1
CM07F822J03		7-100	1	DM15C100J01		13-32A	1
CR40911023		3-149	1	DM15C120J01		6-17	1
		3-150	1	DM15F510J03		6-22	1
CR55U52-30000MC		11-136	1			6-102	1
CR76U32-80370MC		15-47	1			6-130	AR
CR76U33-22040MC		15-46	1			6-131	AR
CR76U33-63700MC		15-45	1			15-57	1
CR76U34-05370MC		15-44	1	DM20F432J300WV		14-57	1
CR76U34-47040MC		15-43	1	DM30F103F03		8-71	1
CR76U34-88700MC		15-42	1	DM30F123F03		7-77	1
CR76U35-30370MC		15-41	1	DM30F203F03		7-85	1
CR76U35-72040MC		15-40	1			7-86	1
				DM30F562F03		8-61	1
				DM42F403F03		7-66	1

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NUMERICAL INDEX

PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ	PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ
DPA32-34P1		21-25	1			6-146A	1
		21-26	1			7-16	1
DP439-433WHT		11-174	15			7-101	1
D10456		8-51	1			7-115	1
EL047		2-4	1			7-121	1
FCSC		21-53	23	K100J20S		2-76	1
		21-90	41	K15J20S		10-22	1
FHS440-5		21-115	5	K19203C4A		21-6	1
FSP161		16-10	1	K2R2J20S		11-8	1
F02A250V1 1-2AS		21-55	1			11-102	1
		21-84	1			11-127	1
		21-91	1	K2R2J35S		2-162	1
F02A250V1-2AS		21-54	1			5-31	1
F12NCFMA2-62		21-113	1			5-135	1
F12NCFMA2-82		21-116	6			5-163	1
F22NCFMA1-26		2-194	4			5-204	1
		6-235	10			6-21	1
		7-206	12			6-24	1
		8-153	19			6-47	1
		11-20	1			6-51	1
		11-90	2			6-53	1
		23-6	2			6-94	1
		23-18	2			6-135	1
F22NCFMA1-40		6-234	2			6-161	1
F22NCFMA2-26		23-15	2	K22J15S		6-199	1
		21-117	5			2-162A	1
F22NCFMA2-40		14-69	4	K3R3J35S		8-110	1
		21-118	18			8-3	1
F22NM107-62		21-7A	2			8-12	1
F440-1		21-114	3			8-33	1
GA-33UUFPORM5PCT		13-79	1			8-43	1
		13-81	1			8-83	1
		13-83	1			8-87	1
GA2-2UUFPORM5PCT		13-36	1			8-98	1
GA3-3UUFPORM5PCT		13-26B	1			8-115	1
GA5-1UUFPORM5PCT		13-45	1			8-121	1
GA6-2UUFPORM5PCT		13-45	1			8-52	1
G365QWHT		18-93B	1	K4R7J35S		8-98A	1
		18-123B	1	K47J6S		6-111	1
		18-139B	1	MA4127		12-51	1
		18-155C	1	MA4561		13-126	1
G4777-10		9-13	5			13-137	1
		10-45A	1	MDL1		21-91	1
		11-158	2	MEA274-000F		7-63	1
		14-59	7	MFS1-8 6-2K1		2-53	1
		21-9	1	PCTT7			
		21-97	3	MF1-4T7-511K1PCT		7-79	1
HP5N		21-49	1	MF1-8 1K1PCTT7		8-86	1
HRCC81M		21-82	1	MF1-8 14-7K1		7-134	1
JKJH17T82		8-56	1	PCTT7			
KR033J35S		11-7	1	MF1-8 20K1PCTT7		7-49	1
KR047J35S		14-49	1	MF1-8 5-11K1		6-185	1
K1J35S		5-44	1			8-79	1
		5-78A	1	PCTT7			
		5-142	1	MF1-8 61-9K1		8-4	1
		7-156	1	PCTT7			
		8-58	1	MF1-8 75K1PCTT7		7-140	1
K10J20S		5-34	1	MF1-8 8-75K1		8-135	1
				PCTT7			



ILLUSTRATED PARTS CATALOG

SECTION III
PARTS LIST INDEXES

NUMERICAL INDEX

PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ	PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ
MF1-8 95-3K1		8-5	1	MS16535-133		13-158	1
PCTT7				MS16535-51		11-179	1
MF1800V21501F		7-49	AR	MS16535-52		2-193	2
ML7815		18-7	4			5-227	6
MP206-14B		10-38	1			5-240A	2
		10-39	1			6-233	1
MS122118		15-251	2			7-208	4
MS16224-11		13-51	1			7-209	4
		13-58	1			8-152	2
MS16225-1		13-41	1	MS16535-55		8-152	2
		15-54	1	MS16562-189		18-176	4
		15-55	1			23-50	1
		15-56	1	MS16562-190		18-74	1
MS16225-11		16-31	1			18-79	1
MS16225-13		11-13	1			18-121	1
		11-38	1			23-92	1
		11-54	1	MS16562-191		15-95	1
		11-97	1			15-123	1
		11-124	1	MS16562-192		15-180	1
		11-130	1			18-173	2
		11-157	1	MS16562-193		15-250	1
MS16225-14		13-32	1	MS16624-15		15-87	1
		13-43	1	MS16624-18		12-10	1
		13-48	1			12-26	1
		13-53	1			15-117	2
		13-61	1			15-141	1
		13-65	1			15-146	1
MS16225-17		11-117	1			15-176	1
		11-129	1			15-183	1
		16-33	1			15-153	1
MS16225-2		11-31	1			15-225	1
		11-53	1			15-242	1
		11-56	1			18-68	1
		13-26	1	MS16632-1012		3-59	1
		13-109	1			3-90	1
MS16225-21		11-45	1			18-54	5
		11-71	1			23-68	1
		11-103	1			23-83	1
		11-109	1			23-101	1
		11-110	1	MS16632-1018		3-68	1
		11-155	1			13-9	2
		11-132B	1			23-53	1
MS16225-3		11-96	1	MS16632-1025		3-62	1
		13-26A	1			3-109	1
		13-68	1			15-206	1
		13-70	1			23-78	1
		13-121	1			23-95	1
MS16225-4		13-150	1	MS16633-1006		23-28	2
MS16225-5		11-63	1	MS16633-1009		23-62	1
		16-32	1			23-80	1
		16-35	1	MS16633-1012		23-133	1
MS16225-7		11-66	1	MS20365D440A		3-134	1
		15-58	1			8-51	2
MS16225-9		13-27	1			23-131	1
		13-66	1	MS20365D632A		15-214	1
MS16535-11		13-162	1	MS20426AD2-3		21-111	2
				MS20426AD3-3		21-108	10
						21-110	2

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PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ	PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ
MS24692-54		18-65	1			5-33	2
MS35200-1		12-33	4			6-145	2
		12-39	4			7-30	2
		15-17	2			8-150	2
		18-34	12			21-26	8
		10-43	2			21-82	4
MS35200-11		6-114	2			21-89	2
		9-	3			23-5	4
		9-12	4			23-9	2
		21-14	4			23-145	1
MS35200-12		3-18	1	MS35200-33		15-164	1
		3-156	2	MS35200-4		14-17	2
		3-158	1			14-43	2
		9-	1			21-14	4
		9-18	4			3-20	4
		14-45	2	MS35200-5		15-190	2
		14-54	1	MS35200-6		21-10	2
		14-60A	1			21-39	2
		15-15	2			21-45	10
		15-130	1	MS35216-1		11-158	2
		21-12	10			13-24B	5
		21-14	17			13-75	4
		21-18	4			21-50	3
		21-19	4	MS35216-11		3-72	2
		21-20	4			3-92	2
		21-21	4			15-8	4
		21-64	4			21-12	1
		21-76	2			21-27	1
		21-79	4			21-36	1
MS35200-13		9-	1	MS35216-12		3-2	2
		15-238	3			3-22	2
		21-4	3			3-50	6
		21-24	3			3-159	1
		21-94	2			3-162	1
MS35200-14		21-56	2			6-115	2
MS35200-2		10-14	4			8-51	2
		10-45A	1			9-	2
		11-18	1			9-15	6
		11-83	2			10-40	2
		11-92	9			10-43	1
		13-2	10			14-45	1
		14-60	6			15-11	2
		15-98	6			18-50	4
		15-100	6			18-106	1
		21-83	2			21-24	2
		21-95	11			21-30	2
		21-96	3			21-35	6
		21-97	3			21-52	2
		21-98	1	MS35216-13		2-35	2
		21-100	1			3-40	1
MS35200-22		14-65	1			3-45	2
MS35200-23		9-18	2			3-49	3
MS35200-24		18-31	1			3-143	2
MS35200-27		18-49	4			15-89	1
MS35200-3		3-16	2			18-163	1



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PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ	PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ
		21-62	1	MS35216-3		3-39	1
		21-85	1			3-73	1
		21-93	3			3-95	1
		23-10	4			3-119	2
MS35216-14		21-62	1			5-41	2
MS35216-15		15-116	1			11-4	2
		18-164	1			13-111	2
MS35216-16		18-159	4			21-52	5
MS35216-17		22-36	1			21-89	4
MS35216-2		1-1	2			23-32	3
		2-3	1			23-35	2
		2-47	1			23-112	3
		3-8	6			23-116	3
		7-65	6			23-137	2
		8-17	1	MS35216-30		12-1	1
		8-25	1	MS35216-31		15-216	1
		8-48	1	MS35216-33		15-165	2
		8-61	1	MS35216-4		13-2A	3
		8-63	1			13-6A	2
		8-65	1			15-139	2
		8-67	1			23-108	3
		8-71	1			23-124	3
		8-82	1			23-128	3
		10-11	4			23-142	6
		11-3	9	MS35216-44		14-58	1
		11-167	4			23-1	4
		13-2A	2	MS35216-45		15-158	2
		13-12A	4	MS35216-5		15-139	2
		13-71	13			21-82	4
		13-85	8	MS35216-6		10-35	2
		14-1	1	MS35216-8		13-3A	2
		14-60	6			15-199	2
		15-2	10	MS35333-75		13-14	1
		15-5	4	MS35337-77		11-3	9
		15-82	2			11-4	2
		15-101	1			11-158	2
		15-104	4			11-167	4
		15-132	1			13-2A	5
		16-36	2			13-38	2
		23-64	1			13-12B	4
		23-70	1			13-24C	5
		23-85	1			13-71	13
		23-103	1			14-1	1
		23-120	2			21-10	1
MS35216-23		9-	1			21-36	1
		9-18	4			21-37A	2
MS35216-27		10-39	2			21-48A	2
		15-155	2			21-95	1
		21-1	4			21-96	3
		21-92	1			21-98	1
MS35216-28		11-1	3			21-100	1
		13-1	4	MS35337-78		18-51	4
		15-245	1			18-105	1
MS35216-29		10-21	4			21-18	4
		15-126	1			21-21	3
						21-22	3
				MS35337-79		12-4	1

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PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ	PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ
MS35338-77		18-2	2			10-43	1
		3-9	6			14-16	2
		3-12	6			14-44	2
		3-41	1			14-45	1
		3-83	1			14-60A	1
		3-87	1			15-9	4
		3-96	1			15-12	2
		3-102	2			15-108	2
		3-120	2			15-108C	1
		3-123	3			15-112	1
		3-130	3			15-136	2
		3-148	6			15-145	2
		3-153	3			21-62	1
		9-15	6			23-12	6
		10-11	4	MS35338-79		9-	1
		10-35	2			9-18	4
		10-45A	1			10-21	4
		14-43	2			10-39	2
		15-3	10			11-2	1
		15-6	4			15-157	2
		15-83	2			15-162	1
		15-102	1			15-166	2
		15-105	4			15-247	1
		15-133	1			21-1	4
		16-36	2	MS35338-80		3-6	4
		18-160	4	MS35338-81		10-17	2
		18-165	2	MS35489-4		2-52	1
		23-33	3			2-61	1
		23-36	2			5-43	1
		23-65	1			5-73	1
		23-71	1	MS35649-24		10-35	2
		23-86	1			21-98	1
		23-104	1	MS51053-126		12-12	1
		23-109	3			12-22	1
		23-113	3	MS51053-402		13-97	16
		23-117	3			15-77	2
		23-121	2			15-79	2
		23-125	3	MS51053-412		12-61	1
		23-129	3			13-11	2
		23-138	2			18-47	9
		23-143	6	MS51053-426		9-6	2
		23-149	5			9-20	2
MS35338-78		2-35	2			15-119A	2
		3-3	2			15-170	2
		3-23	2			15-173	2
		3-42	1			15-228	2
		3-46	2	MS51957-4		21-48A	2
		3-51	9	MS51959-13		21-21	3
		3-74	2	MS51959-14		21-48B	2
		3-93	2	MS51959-2		21-87B	2
		3-144	2	MS51959-3		21-37A	2
		3-160	1	MO-7940		15-34	1
		3-163	1	MO-7941		15-33	1
		9-	2	MO-7942		15-32	1
		10-40	2	MO-7943		15-31	1
				MO-7944		15-30	1
				MO-7945		15-29	1
				MO-7946		15-28	1
				MO-7947		15-27	1



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PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ	PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ
M0-7948		15-26	1			6-168	1
M0-7949		15-25	1			6-191	1
M206-1000M		13-118	1			7-31	1
M23-500M		13-131	1			7-106	1
		13-138	1			8-111	1
		13-143	1			8-138	1
NS1018		5-7	1			10-1	1
N5001-43C		18-11	8			10-2A	1
PL100984		9-12	1			11-10	1
PS11CZ		23-114	1			11-30	1
P334-0249-00		13-13	1			11-34	1
RC07GF100K		2-157	1			11-50	1
		5-140	1			11-72	1
		5-186	1			11-77	1
		7-31	1			11-95	1
		13-46A	1			11-138	1
		18-149	1			11-151	1
RC07GF101K		5-202	1			13-29	1
		6-109	1			14-34	1
		7-29	1			14-48	1
		7-45	1			18-112	1
		7-97	1			18-131	1
		7-179	1			18-148	1
		8-22	1	RC07GF103K		2-19	1
		8-32	1			2-58	1
		8-53	1			2-59	1
		8-59	1			2-79	1
		8-99	1			2-104	1
		8-100	1			2-119	1
		8-114	1			2-146	1
		8-117	1			2-147	1
		8-132	1			5-26	1
		11-15	1			5-61	1
		11-119	1			5-98	1
		11-133	1			5-114	1
		13-40	1			5-164	1
RC07GF102K		2-13	1			5-177	1
		2-55	1			5-181	1
		2-56	1			5-183	1
		2-114	1			5-215	1
		2-130	1			6-5	1
		2-134	1			6-108	1
		2-152	1			6-141	1
		2-166	1			6-189	1
		2-172	1			6-204	1
		5-91	1			7-4	1
		5-113	1			7-41	1
		5-119	1			7-55	1
		5-143	1			7-69	1
		5-158	1			7-127	1
		5-193	1			7-135	1
		5-197	1			7-153	1
		5-224	1			7-154	1
		6-125	1			7-161	1
		6-142	1			7-166	1
						7-170	1
						7-172	1



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PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ	PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ
		8-16	1			5-27	1
		8-54	1			5-195	1
		8-76	1			6-38	1
		8-93B	1			6-92	1
		8-94	1			6-175	1
		8-116	1			7-112	1
		8-139	1			7-117	1
		8-145	1			8-136	1
		10-1	1			10-3B	1
		10-2	1			10-4A	1
		10-2A	1	RC07GF153K		13-113	1
		11-108	1			2-93	1
		14-50	1			2-160	1
		14-56	1			5-20	1
RC07GF104J		13-69	1			5-22	1
RC07GF104K		2-63	1			5-37	1
		2-109	1			5-56	1
		2-167A	AR			5-77	1
		5-25	1			5-82	1
		5-104	1			5-190	1
		5-145	1			5-191	1
		5-176	1			5-205	1
		5-208	1			6-133	1
		5-221	1			6-211	1
		7-19	1			7-14	1
		7-23	1			7-28	1
		7-74	1			7-126	1
		7-104	1			7-130	1
		7-123	1	RC07GF154K		8-126	1
		7-129	1			2-167A	AR
		8-2	1			5-123	1
		8-39	1			5-180	1
		8-75	1	RC07GF181K		7-124	1
		8-128	1			7-105	1
		14-55	1			7-139	1
RC07GF106K		10-28	1	RC07GF182K		8-124	1
		10-29	1			11-101	1
RC07GF121K		5-196	1	RC07GF183K		2-117	1
		6-83	1			2-138	1
		10-44	1			2-141	1
		16-7A	1			5-21	1
RC07GF122K		2-5	1			5-50	1
		2-74	1			5-122	1
		5-58	1			5-137	1
		6-128	1			5-159	1
		8-8	1			6-184	1
		13-28	1			7-42	1
RC07GF123K		2-85	1			7-89	1
		5-155	1			7-149	1
		7-90	1			7-164	1
RC07GF124K		2-167A	AR			8-112B	1
RC07GF151K		6-170	1			8-112C	1
		11-161	1			11-159	1
		18-113	1	RC07GF184K		2-167A	AR
		18-132	1	RC07GF220K		11-134A	1
RC07GF152K		2-110	1	RC07GF220K		13-55	1
						16-30	1
				RC07GF221K		6-170	1



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PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ	PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ
RC07GF222K		11-39	1			10-7	1
		11-46	1			10-9	1
		11-80	1			13-33	1
		11-142	1			14-9	1
		16-27	1			14-10	1
		16-37	1			14-21	1
		2-11	1			14-22	1
		2-108	1	RC07GF224K		2-167A	AR
		2-156A	1			7-81	1
		2-158	1			8-92B	1
		5-128	1			10-23A	1
		5-133	1			11-106	1
		5-134	1	RC07GF270K		6-139	1
		5-147	1			6-164	1
		6-15	1	RC07GF271K		2-161	1
		6-44	1			6-67	1
		6-64	1			6-149	1
		6-91	1	RC07GF272K		2-54	1
		6-106	1			5-175	1
		6-165	1			5-198	1
		6-177	1			5-218	1
		6-206	1			6-154	1
		7-119	1			7-116	1
		7-158	1			8-30	1
		7-160	1			8-93	1
		8-20	1			8-93A	1
		8-78	1			11-78	1
		8-92A	1			13-38	1
		8-102	1			16-24	1
		8-106	1	RC07GF273K		5-110	1
		8-107	1			6-117	1
		8-113	1			6-162	1
		8-125	1			7-11	1
		8-127	1			7-20	1
		11-32	1			7-72	1
		11-112	1			7-120	1
		13-37	1			7-136	1
		13-100	1			7-173	1
		14-30	1			8-99A	1
		14-33	1			14-32	1
		14-40	1	RC07GF274K		2-167A	AR
		16-23	1	RC07GF330K		13-40	1
RC07GF223K		2-173	1	RC07GF331K		8-103	1
		5-35	1	RC07GF332K		2-127	1
		5-129	1			2-132	1
		5-157	1			5-161	1
		5-176	1			5-192	1
		5-215	1			6-14	1
		6-11	1			6-63	1
		6-100	1			6-98	1
		6-103	1			6-138	1
		6-197	1			6-173	1
		10-3	1			6-188	1
		10-3A	1			6-205	1
		10-6	1			7-181	1



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RC07GF823K	2-167A	AR
	5-156	1
RC07GF824K	7-168	1
RC20GF101K	9-9	3
RC20GF102K	2-156	AR
RC20GF103K	10-32	1
	10-37	1
RC20GF122K	2-156	AR
RC20GF152K	2-156	AR
RC20GF182K	2-20	1
	2-156	AR
	14-37	1
RC20GF221K	2-156	AR
RC20GF222K	2-156	AR
	11-152	1
	13-67	1
RC20GF271K	2-156	AR
RC24GF331K	2-156	AR
RC20GF332K	8-127A	1
RC20GF391K	2-156	AR
RC20GF471K	2-156	AR
RC20GF560K	12-59	1
RC20GF561K	2-156	AR
RC20GF681K	2-156	AR
RC20GF682K	10-26	1
	10-31	1
RC20GF821K	2-156	AR
RC32GF181K	5-17	1
RC32GF272K	7-84	1
RC32GF681K	7-93	1
RC42GF100K	9-10	1
RFTSM78SL	16-45	6
RN60C1211F	22-16	1
RN60C1212F	22-6	1
RN60C1471F	11-59	1
RN60C1781F	22-19	1
	22-21	1
	22-23	1
RN60C2151F	21-77	1
	21-78	1
	22-24	1
RN60C2152F	22-13	1
RN60C2671F	22-20	1
RN60C3161F	22-7	1
RN60C3162F	22-8	1
RN60C3831F	22-15	1
RN60C6190F	22-14	1
RN60D1000F	11-153	1
RN60D1001F	6-32	1
	6-37	1
	6-71	1
RN60D1002F	5-207	1
	13-125	1
RN60D1052F	5-207	1
RN60D1102F	5-151	1
RN60D1331F	6-169	1
	6-196	1
RN60D1961F	13-67	1
RN60D1962F	7-7	1
RN60D1963F	13-123	1
RN60D2152F	5-152	1

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RN60D2372F	7-25	1
RN60D2151F	5-10	1
	5-220	1
	6-31	1
	6-74	1
	7-143	1
RN60D2612F	6-143	1
RN60D2613F	5-46	1
	7-63	1
RN60D3161F	2-2	1
	2-155	1
	6-27	1
	6-126	1
RN60D3162F	5-67	1
RN60D3482F	5-92	1
RN60D3832F	7-59	1
RN60D4221F	6-95	1
RN60D4640F	5-117	1
	6-194	1
RN60D4641F	6-167	1
RN60D5110F	6-75	1
RN60D5111F	2-144	1
RN60D5112F	8-55	1
RN60D56R2F	6-159	1
RN60D5621F	2-44	1
RN60D5622F	2-154	1
	5-47	1
RN60D6191F	5-108	1
	5-219	1
RN60D6192F	7-103	1
RN60D6811F	6-166	1
RN60D7152F	7-103	1
RN60D7501F	2-96	1
RN60D9091F	6-70	1
	7-94	1
RN60G1002F	13-125	1
RN65B1210F	11-76A	1
RN65B1961F	13-67	1
RN65B2151F	5-97	1
RN65B6190F	5-96	1
RN65C5623F	22-12	1
RTMT12-2M	21-36	1
	21-95	11
	21-99	1
RTMT12M	3-17	1
	15-111	1
	15-129	1
	21-16	1
	21-21	4
	21-22	3
RW29V470	21-61	1
RW65G1820	14-43	1
RW67V471	2-84	1
RW69V101	13-42	1
	13-57	1
RW69V2R2	10-13	1
RW69V221	2-29	1
RW69V3R9	2-28	1
RW69V331	6-30	1
RW69V470	2-25	1
RW69V561	2-30	1



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PART NUMBER	FIG.-ITEM	QTY
RW69V680	13-63	1
R471-61	17-7	1
	17-13	1
R471-62	17-8	1
	17-24	1
R471-63	17-1	1
	17-2	1
	17-3	1
	17-4	1
	17-5	1
	17-6	1
	17-9	1
	17-20	1
	17-21	1
	17-22	1
	17-23	1
	17-25	1
R471-64	17-10	1
	17-11	1
	17-12	1
	17-14	1
	17-15	1
	17-16	1
	17-17	1
	17-18	1
	17-19	1
SDB1K01103M	5-6	1
SDB1K02154M	21-28	1
	21-29	1
SDB1K04224M	21-87	1
SFR1PPK25-26	3-24	2
	3-37	2
	3-75	1
	3-77	1
	3-60	1
	3-112	1
	3-116	1
SFR155PPK25-7	15-167	1
	15-182	1
	15-211	1
	15-217	1
	15-224	1
SFR166PPK25-7	15-90	2
	15-96	2
	15-124	2
	15-230	1
	15-244	1
SFR168PPK25-7	15-205	1
SFR1810PPK25-7	15-151	1
	15-204	1
SKT14BRN	18-167	1
SKT14YEL	18-170	1
SKT14RED	18-168	1
SKT14ORN	18-169	1
SKT41BLK	2-184	1
	5-229	1
	6-214	1
	7-194	1
	8-170	1
	21-104	1
	21-105	1

PART NUMBER	FIG.-ITEM	QTY
	21-106	1
SKT41BLU	2-180	1
	5-233	1
	6-218	1
	8-166	1
	11-84	1
SKT41BRN	2-175	1
	2-185	1
	5-228	1
	5-238	1
	6-213	1
	6-223	1
	7-192	1
	7-193	1
	8-160	1
	8-161	1
	11-89	1
SKT41GRN	2-179	1
	5-234	1
	6-219	1
	7-188	1
	8-165	1
	11-85	1
SKT41GY	2-182	1
	5-231	1
	6-216	1
	7-196	1
	8-168	1
SKT41VIO	2-181	1
	5-232	1
	6-217	1
	7-197	1
	8-167	1
	11-19	1
SKT41WHT	2-183	1
	5-230	1
	6-215	1
	7-195	1
	8-169	1
SKT41YEL	2-178	1
	5-235	1
	6-220	1
	7-189	1
	8-164	1
	11-86	1
SKT41RED	2-176	1
	5-237	1
	6-222	1
	7-191	1
	8-162	1
	11-88	1
SKT41ORN	2-177	1
	5-236	1
	6-221	1
	7-187	1
	7-190	1
	8-163	1
	11-87	1
SL275-197DRED	10-48	3
SL275-197DWHT	2-186	10
	5-241	6



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PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ	PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ
		6-37	1	RN65B2151F		5-97	1
		6-71	1	RN65B6190F		5-96	1
RN60D1002F		5-207	AR	RN65C5623F		22-12	1
		13-125	1	RN65D2150F		23-118	1
RN60D1052F		5-207	AR	RS2C3R100J		10-13	AR
RN60D1102F		5-151	1	RTMT12-2M		21-36	1
		5-207	AR			21-95	10
RN60D1331F		6-169	1			21-99	1
		6-196	1	RTMT12M		3-17	1
RN60D1961F		13-67	1			15-111	1
RN60D1962F		7-7	1			15-129	1
RN60D1963F		13-123	1			21-16	1
RN60D2152F		5-152	1			21-21	4
RN60D2372F		7-25	1			21-22	3
RN60D2151F		5-10	1	RW29V470		21-61	1
		5-220	1	RW65G1820		14-43	1
		6-31	1	RW67V471		2-84	1
		6-74	1	RW69V1R0		10-13	AR
		7-143	1	RW69V101		13-42	1
RN60D2612F		6-143	1			13-57	1
RN60D2613F		5-46	1	RW69V2R2		10-13	AR
		7-63	1	RW69V221		2-29	1
RN60D2872F		5-67	1	RW69V3R9		2-28	1
RN60D3161F		2-2	1	RW69V331		6-30	1
		2-155	1	RW69V470		2-25	1
		6-27	1	RW69V561		2-30	1
		6-126	1	RW69V680		13-63	1
RN60D3162F		5-67	1	RW69V820		13-57	1
RN60D3482F		5-92	1	R471-61		17-7	1
RN60D3832F		7-59	1			17-13	1
RN60D4221F		6-95	1	R471-62		17-8	1
RN60D4640F		5-117	1			17-9	1
		6-194	1			17-24	1
RN60D4641F		6-167	1	R471-63		17-1	1
RN60D5110F		6-75	1			17-2	1
RN60D5111F		2-144	1			17-3	1
RN60D5112F		8-55	1			17-4	1
RN60D56R2F		6-159	1			17-5	1
RN60D5621F		2-44	1			17-6	1
RN60D5622F		2-154	1			17-20	1
		5-47	1			17-21	1
RN60D6191F		5-108	1			17-22	1
		5-219	1			17-23	1
RN60D6192F		7-103	1			17-25	1
RN60D6811F		6-166	1	R471-64		17-10	1
RN60D7152F		7-103	1			17-11	1
RN60D7501F		2-96	1			17-12	1
RN60D8252F		13-123	1			17-14	1
RN60D9090F		6-155	1			17-15	1
RN60D9091F		6-70	1			17-16	1
		7-94	1			17-17	1
RN60G1002F		13-125	1			17-18	1
RN60G3012F		13-125	1			17-19	1
RN65B1210F		11-76A	1	SDB1K01103M		5-6	1
RN65B1961F		13-67	1	SDB1K02154M		21-28	1
						21-29	1
				SDB1K04224M		21-87	1



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PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ	PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ
SFR1PPK25-26		3-24	2			5-231	1
		3-37	2			6-216	1
		3-75	1			7-196	1
		3-77	1			8-168	1
		3-60	1	SKT41VIO		2-181	1
		3-112	1			5-232	1
		3-116	1			6-217	1
SFR155PPK25-7		15-167	1			7-197	1
		15-182	1			8-167	1
		15-211	1			11-19	1
		15-217	1	SKT41WHT		2-183	1
		15-224	1			5-230	1
SFR166PPK25-7		15-90	2			6-215	1
		15-96	2			7-195	1
		15-124	2			8-169	1
		15-230	1	SKT41YEL		2-178	1
		15-244	1			5-235	1
SFR168PPK25-7		15-205	1			6-220	1
SFR1810PPK25-7		15-151	1			7-189	1
		15-204	1			8-164	1
SKT14BRN		18-167	1			11-86	1
SKT14YEL		18-170	1	SKT41RED		2-176	1
SKT14RED		18-168	1			5-237	1
SKT14ORN		18-169	1			6-222	1
SKT41BLK		2-184	1			7-191	1
		5-229	1			8-162	1
		6-214	1			11-88	1
		7-194	1	SKT41ORN		2-177	1
		8-170	1			5-236	1
		21-104	1			6-221	1
		21-105	1			7-187	1
		21-106	1			7-190	1
SKT41BLU		2-180	1			8-163	1
		5-233	1			11-87	1
		6-218	1	SL275-197DRED		10-48	3
		8-166	1	SL275-197DWHT		2-186	10
		11-84	1			5-241	6
SKT41BRN		2-175	1			6-230	11
		2-185	1			7-203	6
		5-228	1			8-158	10
		5-238	1			10-49	17
		6-213	1			11-174	14
		6-223	1			13-163	13
		7-192	1			14-63	15
		7-193	1			22-51	27
		8-160	1	SL278-198D		11-176	18
		8-161	1			13-168	14
		11-89	1	SL286-301DRED		2-189	12
SKT41GRN		2-179	1	SL286-301DWHT		2-188	107
		5-234	1			5-248	122
		6-219	1			6-231	137
		7-188	1			7-198	116
		8-165	1				
		11-85	1				
SKT41GY		2-182	1				

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PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ	PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ
		8-155	100	TGC11F4A067		3-149	1
		10-50	7			3-150	1
		11-177	49	TITM1-4 1-8K		7-147	1
		13-166	23	PORM10PCT			
		14-64	25	TITM1-4 3900		8-6A	1
		16-46	17	-5PCT			
		17-27	30	TITM1-4 500-5PCT		2-50	1
		22-50	26	TITM1-4 8-2K		7-61	1
SL295-315				PORM10PCT			
		2-192	44	TITM1-4-100-		13-61A	1
		5-239	85	10PCT			
		6-226	32	TITM1-4-100-		13-61B	1
		7-202	50	10PCT			
		8-157	64	TRANSFORMER ASSY		9-	1
		10-47	3	TXB2P032-037-3		13-155	1
		16-42	3	T1328		6-36	1
SL300-314D		22-53	17	T389		10-5B	1
		6-229	4	UG1094U		21-2	1
		8-156	2			21-3	1
SL356-314WHT		13-167	10	UG1465U		18-41	1
SPL1N459		7-108	1	VC21G		13-72	1
SPL1N904		6-9	1			13-73	1
		6-12	1			13-74	1
		6-61	1			13-75	1
		6-62	1	W301A		10-16	1
		6-172	1			10-17	1
		11-82	1	X665-3		11-122	1
SS3332FCEP25		23-37	4	X690-2		11-154	1
LY5				01-611		5-23	1
SS3332FCEP25		23-40	2	01-612		5-51	1
LY5				01-613		5-36	1
SS3332FCEP25		23-45	2	01-901		16-9	1
LY5				015-0558-00		21-62	1
SS3332FCEP25		23-81	2	047-0187MDP		13-24	1
LY5				05-3307-01		11-172	8
SS5169		11-175	13			16-41	4
		13-164	1	05-3307-51		2-196	22
SS5170		11-178	12			5-250	26
STA552-1		2-162	1			6-237	32
		5-81	1			7-211	20
		5-182	1			8-172	20
		5-188	1			10-51	2
		5-189	1			11-171	4
ST10087		23-126	1			14-62	5
S187-312HHP15L02		13-93	1			22-49	6
S187-375HHP		12-9	1	IN1116		22-1	1
15LG31						22-2	1
S187-375HHP		18-60	1	IN198		2-129	1
S518FCHHEP25LY5		3-137	2			5-126	1
		23-134	2			5-132	1
S5632FCHHP25L01		15-152	1			5-210	1
		15-154	1			5-212	1
		15-181	1	IN2610		2-86	1
		15-188	1			9-11	1
TEFTW18B		19-8	AR			14-4	1
TF300		21-87B	2				



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PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ	PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ
		14-5	1			7-33	1
		14-7	1			7-35	1
		14-46	1			7-38	1
		14-47	1			7-40	1
		21-86	1			7-53	1
		22-34	1			7-54	1
		22-38	1			7-113	1
		22-41	1			7-131	1
		22-43	1			7-155	1
		22-44	1			7-163	1
		22-45	1			7-178	1
1N2613		10-27	1			11-123	1
		10-36	1			14-25	1
1N2614		22-3	1	1N2974RB		22-37	1
		22-46	1	1N2989B		2-87	1
1N270		5-116	1			7-91	1
		5-169A	1	1N2999B		7-17	1
		5-172	1	1N3020B		5-206	1
		5-173	1	1N3284		9-8	1
		5-174	1	1N3713		6-34	1
		5-184	1			6-35	1
		5-185	1			6-192	1
		5-187	1	1N458		2-12	1
		5-199	1			2-16	1
		5-200	1			2-41	1
		5-201	1			2-49	1
		6-6	1			2-69	1
		6-7	1			2-70	1
		6-20	1			2-75	1
		6-42	1			2-80	1
		6-45	1			2-90	1
		6-46	1			2-97	1
		6-60	1			2-101	1
		6-65	1			2-112	1
		6-66	1			2-116	1
		6-80	1			2-121	1
		6-81	1			2-122	1
		6-84	1			2-123	1
		6-85	1			2-124	1
		6-96	1			2-125	1
		6-99	1			2-128	1
		6-134	1			2-131	1
		6-151	1			2-133	1
		6-158	1			2-140	1
		6-174	1			2-143	1
		6-182	1			2-145	1
		6-183	1			2-159	1
		6-195	1			2-171	1
		6-200	1			5-8	1
		6-208	1			5-9	1
		6-209	1			5-29	1
		6-210	1			5-80	1
		7-12	1			5-89	1
		7-32	1			5-95	1



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PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ	PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ
		5-101	1			8-92	1
		5-102	1			8-94A	1
		5-109	1			8-94B	1
		5-111	1			8-94C	1
		5-112	1			8-94D	1
		5-115	1			8-95	1
		5-120	1			8-96	1
		5-125	1			8-112A	1
		5-127	1			8-118	1
		5-136	1			8-119	1
		5-139	1			8-120A	1
		5-144	1			10-1A	1
		5-148	1			10-8	1
		5-149	1			10-10	1
		5-150	1			10-18	1
		5-153	1			10-23	1
		5-154	1			10-24	1
		5-160	1			10-25	1
		5-166	1			14-8	1
		5-178	1			14-11	1
		5-179	1			14-12	1
		5-214	1			14-13	1
		5-216	1			14-18	1
		5-217	1			14-19	1
		5-217A	1			14-20	1
		5-222	1			14-23	1
		5-223	1			14-26	1
		6-23	1			14-27	1
		6-178	1			14-28	1
		7-12	1			14-29	1
		7-15	1			22-4	1
		7-18	1			22-5	1
		7-24	1			22-9	1
		7-32	1			22-10	1
		7-33	1	1N459		7-68	1
		7-35	1			7-96	1
		7-38	1			7-108	1
		7-40	1			7-125	1
		7-44	1			7-138	1
		7-48	1			7-142	1
		7-51	1	1N643		5-1	1
		7-60	1			5-55	1
		7-64	1			5-167	1
		7-75	1			5-168	1
		7-78	1	1N645		21-59	1
		7-102	1			21-60	1
		7-114	1			21-87A	1
		7-122	1			22-42	1
		7-131	1	1N648		10-23	1
		7-132	1			10-25	1
		7-163	1			10-27A	1
		7-169	1			10-30	1
		7-178	1			15-105A	1
		8-14	1	1N715A		6-152	1
		8-15	1	1N746A		2-9	1



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PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ	PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ
		2-73	1			13-56	1
		2-118	1			2-1	1
		2-120	1	150D106X0035R2		2-46	1
		2-168	1			6-39	1
		8-129	1	150D124X9035A2		6-124	1
		14-52	1			2-151	1
1N747A		15-128	1	150D155X0020A2		7-128	1
1N751A		5-53	1	150D155X0035B2		8-72	1
		5-54	1			5-69	1
		5-170	1	150D223X0035A2		5-130	1
		5-171	1			8-7	1
		6-129	1	150D226X0035R2		8-44	1
		6-201	1			8-45	1
		7-176	1	150D273X9035A2		8-88	1
1N753A		22-17	1	150D475X0050B2		7-5	1
1N754A		22-22	1	150D476X0020R2		2-39	1
1N756A		2-64	1			5-45	1
		2-156B	1			5-62	1
		5-84	1			5-100	1
		8-104	1			8-80A	1
		8-133	1	150D684X0035A2		7-137	1
1N830A		11-100	1	151D114X0035A2		7-118	1
1N964B		5-216	1			7-133	1
		8-19A	1			7-34	1
1N966B		8-100A	1	151D235X0035B2		7-152	1
1N967B		8-94F	1			7-171	1
100-200-16-1		5-226	2			7-174	1
		7-208	2			7-175	1
		21-108	3			8-1	1
100-200-16-8		6-233	1			8-80	1
		21-110	1			8-91	1
100-200-5-0		5-227	1			8-120	1
100-200-5-24		5-240	1			8-122	1
		5-240A	1			8-131	1
100-200-8A6		21-111	1	1510505X0020B2		8-93C	1
100-200-9-3		21-109	1	18-746		21-37	1
100-206-2		8-152	1	19C214		6-207	1
100-245		13-162	1	1912-00-00-2480		12-73	3
1051		21-35	2	195-207		8-151A	2
109D106X0050C2		2-83	1	196P22451S2		7-3	1
109D107X0025F2		5-64	1	196P47456S26		10-41	1
109D127X0015F2		2-8	1			10-42	1
		2-67	1	196P82351S4		5-2	1
109D187X9025T2		21-67	1			5-18	1
109D476X0050F2		2-18	1	2N1132		7-56	1
		5-68	1	2N1142		13-110	1
109D505C2050C2		22-40	1			13-110	1
109D686X0030F2		5-78	1			13-154	1
		6-28	1			13-154	1
109D826X0050T2		2-24	1	2N1488		2-22	1
109054-325		21-15	3			14-15	1
1120-0330		3-131	1			21-70	1
118P10302S4		10-12	1			21-72	1
		10-15	1			21-74	1
118P47492S4		5-40	1	2N1692		13-135	1
150D103X0035A2		6-140	1			13-136	1
150D105X9035A2		13-28A	1				
		13-50	1				



ILLUSTRATED PARTS CATALOG

PART NUMBER	FIG.-ITEM	QTY
310-0077-00	21-71	2
	2-23	2
	21-73	1
	21-74	1
310-0078-00	13-136	2
	13-149	1
	13-156	1
	21-20	4
310-0081-00	13-126	1
	13-137	1
310-0276-00	18-25	1
310-6320-00	3-84	1
	3-88	1
	3-103	2
	13-2A	3
310-6360-00	22-27	2
	10-21	4
	12-74	2
	10-35A	3
312-0063-00	14-43	2
313-0050-00	11-122	2
313-0051-00	11-154	2
	13-126	1
	13-137	1
	14-44	2
313-0132-00	14-60A	1
	15-107	2
	15-108B	1
	15-111	1
313-0140-00	21-18	3
	21-20	4
	21-56	2
	21-85	1
313-0156-00	14-16	2
	2-23	2
	13-136	2
	13-149	1
320-250-0100	13-156	1
	21-71	1
	21-73	1
	21-74	1
32081	12-6	2
	4-7	1
	4-13	1
	2-35	1
322-0175-00	3-79	2
323-0254-00	3-26	2
324-0054-00	3-147	6
	3-152	3
324-0055-00	3-82	1
	3-86	1
	3-101	2
	3-126	3
324-0056-00	3-129	3
	3-28	1
	3-33	1
	3-53	1
	3-65	1
	3-98	1
	3-106	1
	3-115	1

PART NUMBER	FIG.-ITEM	QTY
324-0057-00	3-122	3
324-0672-00	15-23	2
	15-52	2
	15-64	2
	15-68	2
324-0681-00	15-72	2
	18-24	1
	3-57	2
	15-135	2
328-0368-00	15-144	2
	13-90	4
	12-56	1
	9-7	2
330-1021-00	21-101	1
	21-6	2
	21-6	2
	13-91	1
330-2084-00	13-13	1
330-2099-00	18-27	1
330-2284-00	12-61	1
330-2290-00	13-122	1
330-3599-00	20-1	1
330-3600-00	10-21	4
334-0284-00	11-1	3
334-4050-00	11-2	1
335-0010-00	12-2	1
335-0037-00	13-1	4
338011COH0470J	15-156	2
340546	15-161	1
340-0641-00	15-246	1
	18-3	2
	14-6	3
	14-58	1
340-0642-00	15-159	2
	4-1	3
	4-3	1
	21-7	4
340-120-1001	21-7	3
	3-11	6
	2-27	2
	10-35A	1
341-210-0001	18-92	4
	18-119	4
	18-138	4
	18-154	4
342-0022-00	9-18	1
	22-27	2
	11-1	3
	18-1	2
342-0024-00	13-124	1
	12-8	4
	12-67	8
	13-139	1
342-0123-00	13-134	1
	16-9	1
	14-16	2
	21-71	1
342-0143-00	18-88	4
	18-110	4
	18-129	4
	18-146	4
342-0151-00	18-88	4
	18-110	4
	18-129	4
	18-146	4
342-0273-00	18-88	4
	18-110	4
	18-129	4
	18-146	4
343-0130-00	18-88	4
	18-110	4
	18-129	4
	18-146	4
343-0172-00	18-88	4
	18-110	4
	18-129	4
	18-146	4
343-0284-00	18-88	4
	18-110	4
	18-129	4
	18-146	4
343-0285-00	18-88	4
	18-110	4
	18-129	4
	18-146	4
343-0286-00	18-88	4
	18-110	4
	18-129	4
	18-146	4
343-0288-00	18-88	4
	18-110	4
	18-129	4
	18-146	4
343-0290-00	18-88	4
	18-110	4
	18-129	4
	18-146	4
343-0297-00	18-88	4
	18-110	4
	18-129	4
	18-146	4



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SECTION III
PARTS LIST INDEXES

PART NUMBER	FIG.-ITEM	QTY
343-0298-00	10-45	1
	18-70	12
343-0299-00	9-16	1
	10-35A	2
343-0300-00	18-44	7
343-0301-00	18-38	4
343-0304-00	12-36	4
343-0331-00	2-23	2
343-0332-00	21-71	1
	21-73	1
	21-74	1
343-0510-00	15-160	1
347-0006-00	15-11	5
	21-22	3
347-0038-00	11-2	1
347-0091-00	18-84	7
	18-97	2
	18-101	1
	18-108	6
	18-126	6
	18-143	6
355-122-1520	4-6	1
357001	21-56	2
	21-85	1
	21-92	1
38AS1	3-38	1
38AS2	3-44	1
4D713	20-20	1
40D673	20-10	2
4007-4HOTTINNED	3-14	1
	13-124	1
	14-16	1
	15-110	1
	21-17	1
	21-39	1
403	14-60A	1
4040-2HOTTINNED	2-27	1
	5-33	1
	6-144	1
	7-30	1
	8-143	1
	8-150	1
	9-15	2
	9-16	1
	10-35	2
	10-35A	5
	13-111	1
	15-131	1
	21-10	2
	21-45	5
	21-51	1
	21-98	1
	21-100	1
41A245	15-189	1
	20-	REF
41373	4-14	1
41376	4-2	1
41378	4-1	1
41379	4-4	1
41381	4-5	1

PART NUMBER	FIG.-ITEM	QTY
454D50	18-93C	1
	18-123C	1
	18-139D	1
	18-155D	1
4706-05-01-4102	11-1	3
	13-1	4
47682DET2550	7-84	1
500-9073-001	3-43	1
	3-47	2
	12-3	1
502-1515-002	15-13	2
	21-6	2
503-4970-001	21-1	2
504-0730-003	21-62	1
504-8229-001	11-179	1
504-8506-002	13-134	1
506-5906-003	3-43	1
	3-47	2
5100-50C	18-58	2
5133-12C	3-31	1
	3-135	1
5133-15C	3-5	4
5197	21-4	1
522-2702-011	1-	1
522-2702-014	1-	1
522-2702-052	1-	1
522-2702-053	1-	1
522-2702-054	1-	1
522-2702-056	1-	1
528-0455-004	1-7	1
	3-	REF
53-02C	21-64	1
5348	13-158	1
538011COP089R	13-107	1
	13-120	1
	13-129	1
	13-132	1
	13-140	1
	13-142	1
538011COP092R	13-112	1
538011E2P094R	11-36	1
	11-69	1
	11-79	1
	13-108	1
	13-144	1
	13-148	1
	13-151	1
	13-153	1
540-2172-002	12-27	1
540-7767-002	14-66	2
540-9002-003	10-14	4
540-9004-003	21-83	2
540-9007-003	21-83	2
540-9010-003	21-80	4
540-9038-003	3-157	2
540-9041-003	21-101	1
540-9047-003	21-34	2
541-1215-003	15-108D	1
	15-113	1
541-5177-002	15-114	1
541-5178-002	22-35	1



NUMERICAL INDEX

PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ	PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ
302-2300-00		2-23	2			18-107	6
		14-16	2			18-127	6
		21-62	1			18-144	6
		21-73	1			21-71	2
		21-74	1	310-0077-00		2-23	2
3055BS82524G		10-19	1			21-73	1
310-0033-00		21-74	1			21-74	1
310-0044-00		10-11	4	310-0078-00		13-136	2
		21-82	4			13-149	1
		23-66	1			13-156	1
		23-72	1	310-0081-00		21-20	4
		23-87	1			13-126	1
		23-105	1			13-137	1
		23-147	1	310-0276-00		18-25	1
310-0045-00		21-14	4	310-0501-00		23-23	2
		21-24	2			23-26	2
		21-56	2	310-6320-00		3-84	1
		21-85	1			3-88	1
		21-93	3			3-103	2
310-0046-00		3-136	2			13-2A	3
		11-2	1			22-27	2
		15-127	1			23-150	1
		15-215	1	310-6360-00		10-21	4
		21-92	1	312-0063-00		12-74	2
		23-132	1	313-0050-00		10-35A	3
310-0054-00		11-122	2			14-43	2
		11-154	2	313-0051-00		11-122	2
		13-134	1			11-154	2
		13-139	1	313-0056-00		13-126	1
		14-16	2			13-137	1
		21-71	1	313-0132-00		14-44	2
310-0055-00		2-23	2			14-60A	1
		13-136	2			15-107	2
		13-149	1			15-108B	1
		13-156	1			15-111	1
		21-73	7			21-18	3
310-0059-00		7-17A	1			21-20	4
		7-91A	1			21-56	2
		22-2	2			21-85	1
310-0074-00		10-35A	3			14-16	2
		10-45	1	313-0140-00		2-23	2
		12-37	4			13-136	2
		13-85	8			13-149	1
		18-39	4			13-156	1
		18-45	7			21-71	1
		18-71	12			21-73	1
		18-89	4			21-74	1
		18-111	4	313-0156-00		12-6	2
		18-130	4	32081		2-35	1
		18-147	4	322-0175-00		3-79	2
310-0076-00		11-122	2	323-0254-00		3-26	2
		11-154	2				
		12-7	6				
		12-68	8				
		18-85	7				
		18-98	2				
		18-102	1				



ILLUSTRATED PARTS CATALOG

SECTION III PARTS LIST INDEXES

NUMERICAL INDEX

PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ	PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ
		23-22	2			15-159	2
		23-25	2			23-2	4
324-0054-00		3-147	6	342-0022-00		21-7	4
		3-152	3	342-0024-00		21-7	3
324-0055-00		3-82	1	342-0123-00		3-11	6
		3-86	1	342-0143-00		2-27	2
		3-101	2			10-35A	1
		3-126	3	342-0151-00		18-92	4
324-0056-00		3-129	3			18-119	4
		3-28	1			18-138	4
		3-33	1			18-154	4
		3-53	1	342-0273-00		9-18	1
		3-65	1	343-0130-00		22-27	2
		3-98	1	343-0172-00		11-1	3
		3-106	1			18-1	2
		3-115	1	343-0284-00		13-124	1
		23-30	1	343-0285-00		12-8	4
		23-42	1			12-67	8
		23-57	1			13-139	1
		23-60	1	343-0286-00		13-134	1
		23-77	1			16-9	1
		23-90	1	343-0288-00		14-16	2
324-0057-00		23-99	1	343-0290-00		21-71	1
324-0672-00		3-122	3	343-0297-00		18-88	4
		15-23	2			18-110	4
		15-52	2			18-129	4
		15-64	2			18-146	4
		15-68	2	343-0298-00		10-45	1
		15-72	2			18-70	12
324-0681-00		18-24	1	343-0299-00		9-16	1
324-1673-010		23-30	1			10-35A	2
		23-42	1	343-0300-00		18-44	7
		23-57	1	343-0301-00		18-38	4
		23-60	1	343-0304-00		12-36	4
		23-77	1	343-0331-00		2-23	2
		23-90	1	343-0332-00		21-71	1
		23-99	1			21-73	1
328-0368-00		3-57	2			21-74	1
330-1021-00		15-135	2	343-0510-00		15-160	1
		15-144	2	347-0006-00		15-11	5
330-2084-00		13-90	4			21-22	3
330-2099-00		12-56	1	347-0009-00		23-11	2
330-2284-00		9-7	2	347-0010-00		23-11	2
330-2290-00		21-101	1	347-0038-00		11-2	1
330-3599-00		21-6	2	347-0091-00		18-84	7
330-3600-00		21-6	2			18-97	2
334-0284-00		13-91	1			18-101	1
335-0010-00		18-27	1			18-108	6
335-0037-00		12-61	1			18-126	6
338011C0H0470J		13-122	1			18-143	6
340-0641-00		10-21	4	357001		21-56	2
		11-1	3			21-85	1
		11-2	1			21-92	1
		12-2	1	38AS1		3-38	1
		13-1	4	38AS2		3-44	1
		15-156	2				
		15-161	1				
		15-246	1				
		18-3	2				
340-0642-00		14-6	3				
		14-58	1				



NUMERICAL INDEX

PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ	PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ
4007-4HOTTINNED		3-14	1	522-2702-056		1-	1
		14-16	1	522-2702-058		1-	1
		15-110	1	522-2702-060		1-	1
		21-17	1	528-0455-004		1-7	1
		21-39	1			3-	REF
403		14-60A	1	528-0470-005		1-7	1
4040-2HOTTINNED		2-27	1			23-	REF
		5-33	1	528-0470-006		1-7	1
		6-144	1			23-	REF
		7-30	1	53-02C		21-64	1
		8-150	1	5348		13-158	1
		9-15	2	538011COP089R		13-107	1
		9-16	1			13-120	1
		10-35	2			13-129	1
		10-35A	5			13-132	1
		13-111	1			13-140	1
		15-131	1			13-142	1
		21-10	2	538011COP092R		13-112	1
		21-45	5			13-147	1
		21-51	1			13-151	1
		21-98	1	538011E2P094R		11-36	1
		21-100	1			11-69	1
41A245		15-189	1			11-79	1
454D50		18-93C	1			13-108	1
		18-123C	1			13-144	1
		18-139D	1			13-148	1
		18-155D	1			13-151	1
4706-05-01-4102		11-1	3			13-153	1
		13-1	4	540-2172-002		12-27	1
4708-06-02-4		23-3	4	540-7764-000		21-112	5
102				540-7767-002		14-66	2
47682DET2550		7-84	1	540-9002-003		10-14	4
500-9C73-001		3-43	1	540-9004-003		21-83	2
		3-47	2	540-9007-003		21-83	2
502-1515-002		12-3	1	540-9010-003		21-80	4
		15-13	2	540-9014-003		21-48A	2
		18-52	4	540-9038-003		3-157	2
		21-6	2	540-9041-003		21-21	3
503-4970-001		21-1	2			21-101	1
504-0730-003		21-62	1	540-9047-003		21-34	2
504-8229-001		11-179	1	541-1215-003		15-108D	1
504-8506-002		13-134	1			15-113	1
506-5906-003		3-43	1	541-5177-002		15-114	1
		3-47	2	541-5178-002		22-35	1
5108-50C		18-58	2	541-5179-002		14-54	1
5133-12C		3-31	1	541-5949-002		15-138	2
		3-135	1	541-5951-002		10-34	2
5133-15C		3-5	4			18-161	4
5197		21-4	1	541-5983-002		22-36	1
522-2702-011		1-	1	541-6559-002		23-14	2
522-2702-014		1-	1	542-4091-002		16-44	6
522-2702-052		1-	1	542-4510-002		15-240	2
522-2702-053		1-	1	542-4593-002		15-191	1
522-2702-054		1-	1	542-4596-002		15-197	1
522-2702-055		1-	1	542-4597-002		15-193	1
				542-4598-002		15-194	4
				542-6735-003P		15-237	1



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SECTION III
PARTS LIST INDEXES

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PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ	PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ
542-7481-003		13-6B	2			3-125	3
544-4795-002		15-235	1			23-136	2
544-4796-002		15-235A	1	546-3796-002		3-91	2
544-8060-002		15-175	1			3-155	2
544-8773-003		13-95A	AR	546-3797-002		3-34	1
		15-117A	AR	546-3798-002		3-94	1
		15-230A	AR	546-3799-002		3-128	3
		13-154A	1			23-115	3
545-7544-003		10-42	2	546-3801-002		3-69	1
546-1569-002		15-239	1			23-54	1
546-2215-002		15-234	1			23-74	1
546-2726-002		3-90B	1	546-3802-002		3-110	1
546-3029-003		3-90A	2	546-3809-002		3-61	1
546-3033-003		3-117	1	546-3810-002		3-146	6
546-3751-002		3-56	1			23-127	3
546-3752-002		3-118	1			23-141	6
546-3753-002		3-108	1	546-3795-002		3-121	3
546-3760-002		3-111	1			3-125	3
546-3761-002		3-104	1			23-136	2
546-3762-002		3-67	1	546-3796-002		3-91	2
546-3765-002		23-55	1			3-155	2
		3-70	1	546-3797-002		3-34	1
546-3766-002		23-52	1	546-3798-002		3-94	1
		3-66	1	546-3799-002		3-128	3
546-3767-002		3-107	1			23-115	3
546-3774-002		3-29	1	546-3801-002		3-69	1
546-3775-002		3-30	1			23-54	1
546-3776-002		3-55	1			23-74	1
546-3777-002		3-35	1	546-3802-002		3-110	1
546-3779-002		3-36	1	546-3809-002		3-61	1
546-3781-002		3-161	1	546-3810-002		3-146	6
546-3782-002		3-21	1	546-3811-002		3-25	1
546-3784-002		3-10	1	546-3812-002		3-54	1
546-3788-002		3-113	1	546-3813-002		3-4	4
546-3789-002		3-27	1	546-3818-003		3-164	1
546-3790-002		3-32	1	546-3820-003		3-141	1
		3-64	1	546-3821-013		3-145	1
		3-97	1	546-4670-002		21-26	4
		3-105	1	546-5174-002		15-236	1
		3-114	1	546-5187-002		15-196	2
		23-56	1	546-5207-002		15-198	1
		23-59	1	546-5208-002		15-195	1
		23-76	1	546-8922-003		15-241	1
		23-88	1	546-9086-002		15-178	1
		23-98	1	547-1674-002		12-16	3
546-3791-002		3-52	1	547-1675-002		12-17	3
		23-41	1	547-8177-002		21-71	1
546-3792-002		3-58	1	548-3808-003		3-76	1
546-3794-002		3-151	3	548-6945-002		21-10	2
		23-107	3			21-39	2
		23-123	2	55C23		6-180	1
		23-127	3			6-181	1
		23-141	6				
546-3795-002		3-121	3				



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PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ	PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ
553-4774-002		18-4	1	554-1626-022		1-6	1
553-4775-002		18-	4			2-	REF
553-4801-003		18-5	1	554-1626-023		1-6	1
553-4802-003		18-6	1			2-	REF
553-5024-003		19-5	1	554-1627-00		1-12	1
		19-7	1			9-	REF
553-5025-003		18-61	1	554-1628-00		9-21	1
553-5026-003		18-53	5			18-	REF
553-5028-003		15-142	1	554-1629-00		9-1	1
553-5031-003		13-96	8			10-	REF
553-5034-003		15-219	AR	554-1630-00		9-4	1
553-5035-003		15-220	AR			13-	REF
553-5055-003		18-104	3	554-1631-00		9-2	1
553-5075-003		13-17	1			11-	REF
553-5076-003		13-16	2	554-1632-00		9-18	1
		13-18	2			14-	REF
553-5107-003		8-152	2	554-1633-00		9-3	1
553-5111-003		15-115	1			12-	REF
		18-166	1	554-1634-00		14-2	1
553-5127-003		21-4A	1			15-	REF
554-0180-002		3-78	1	554-1636-002		15-249	1
554-0182-003		3-89	1	554-1637-002		15-226	1
554-0183-003		3-85	1	554-1638-002		15-227	1
554-0184-003		3-81	1	554-1641-002		14-68	3
554-0185-003		3-100	1	554-1644-002		15-171	1
554-0186-003		3-80	1	554-1648-002		15-231	1
554-0187-003		3-99	1	554-1649-002		15-97	1
554-1615-002		3-7	1	554-1650-002		15-168	1
554-1621-00		1-13	1	554-1652-002		15-119	1
		21-	REF	554-1653-002		15-179	1
554-1621-011		1-13	1	554-1654-00		15-140	1
		21-	REF	554-1655-002		15-192	2
554-1621-013		1-13	1	554-1656-002		9-6	1
		21-	REF			9-20	1
554-1621-014		1-13	1			15-118	1
		21-	REF			15-169	1
554-1621-018		1-13	1			15-172	1
		21-	REF	554-1660-002		15-184	1
554-1622-00		1-11	1	554-1666-003		15-229	1
		8-	REF	554-1671-003		15-218	1
554-1623-00		1-10	1	554-1673-003		15-207	1
		7-	REF	554-1683-003		15-134	1
554-1624-00		1-9	1	554-1685-003		15-233	1
		6-	REF	554-1686-003		15-177	1
554-1625-00		1-8	1	554-1692-002		15-121	1
		5-	REF	554-1693-002		15-93	1
554-1626-00		1-6	1	554-1696-002		15-84	1
		2-	REF	554-1698-002		15-94	1
554-1626-011		1-6	1	554-1702-002		15-88	1
		2-	REF	554-1703-002		15-91	1
554-1626-020		1-6	1	554-1704-002		15-51	2
		1-6	1			15-63	2
		2-	REF			15-67	2
		2-	REF	554-1705-002		15-71	2
554-1626-021		1-6	1	554-1706-002		15-22	2
		2-	REF			15-92	1



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PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ	PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ
554-1707-002		15-78	1	554-1798-003		12-32	1
554-1708-002		15-81	1	554-1799-003		12-31	1
554-1711-002		15-14	1	554-1801-003		12-69	1
554-1712-002		15-106	2	554-1803-003		12-24	1
554-1713-002		15-108A	1	554-1804-003		12-23	2
		15-109	1	554-1806-003		12-48	1
554-1726-004		15-75	1	554-1807-002		12-50	1
554-1727-003		15-85	1	554-1811-004		12-25	1
554-1728-003		15-10	1	554-1814-004		12-20	1
		17-	REF	554-1815-004		12-15	1
554-1729-003		17-28	1	554-1817-004		12-71	1
554-1730-003		17-26	1	554-1818-004		12-70	2
554-1732-003		15-76	1	554-1821-002		12-63	1
554-1734-003		15-60	4	554-1822-005		12-35	1
554-1735-003		15-50	4	554-1829-005		15-253	1
		15-62	4	554-1834-002		18-46	9
		15-66	4	554-1837-002		18-18	4
		15-70	4	554-1839-002		19-1	1
		15-74	2	554-1842-002		18-115	1
		15-21	4			18-134	1
554-1736-003		15-24	1			18-151	1
554-1738-003		15-86	1	554-1843-002		18-114	1
554-1741-003		15-18	1			18-133	1
554-1743-004		15-59	1			18-150	1
554-1745-004		15-48	1	554-1844-002		18-75	1
554-1748-004		15-80	1			18-80	1
554-1750-004		15-73	1			18-122	1
554-1752-004		15-69	1	554-1845-002		18-73	1
554-1754-004		15-65	1			18-78	1
554-1756-004		15-61	1			18-120	1
554-1758-004		16-50	1	554-1846-002		18-36	1
554-1759-004		16-40	1	554-1848-002		18-35	4
554-1760-004		15-4	1	554-1849-002		19-6	1
554-1763-004		15-1	1	554-1850-002		18-33	4
554-1765-004		15-49	1	554-1851-002		19-9	1
554-1767-005		12-21	1	554-1853-002		18-8	4
554-1768-002		12-11	1	554-1854-002		18-9	4
554-1769-002		12-19	1	554-1855-002		18-10	4
554-1770-002		12-14	1	554-1858-002		18-15	1
554-1771-002		12-13	1	554-1859-002		18-12	3
554-1772-002		12-66	1	554-1860-002		19-3	1
554-1773-002		12-40	1	554-1861-002		18-171	1
554-1777-002		12-43	1	554-1862-002		18-172	2
554-1778-002		12-44	1	554-1864-002		18-139C	1
554-1779-002		12-45	1			18-155A	1
554-1780-002		12-47	1	554-1865-002		18-21	2
554-1785-002		12-46	1	554-1866-002		18-19	6
554-1788-002		12-38	1	554-1867-002		18-69	3
554-1789-002		12-64	1	554-1868-002		18-23	1
554-1790-002		12-58	1	554-1869-002		18-178	4
554-1797-003		12-60	1	554-1871-002		18-67	1
		12-34	1	554-1873-002		12-28	1
		12-62	1	554-1874-002		18-177	1
		12-29	1				



PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ	PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ
554-1875-002		18-95	1	554-1946-004		18-	1
		18-125	1	554-1947-004		18-123D	1
		18-141	1	554-1948-004		18-139	1
554-1876-002		18-82	2	554-1949-004		18-	1
		18-119C	1	554-1950-004		18-155	1
554-1877-002		18-83	1	554-1951-004		18-137	1
554-1878-002		18-86	1			19-	REF
		18-117	1	554-1952-004		18-118	1
		18-136	1			19-	REF
		18-152A	1	554-1953-004		18-153	1
554-1880-002		18-63	1			19-	REF
554-1881-002		18-93A	4	554-1954-004		18-139E	1
		18-123A	1	554-1955-004		18-155E	1
		18-139A	1	554-1956-004		18-	1
		18-155B	1	554-1957-004		18-	1
554-1882-002		19-4	1	554-1958-004		18-	1
554-1888-002		18-29	1	554-1959-004		18-93D	1
554-1889-002		18-87	1	554-1960-004		18-	1
		18-109	1	554-1961-005		18-179	1
		18-128	1	554-1968-005		13-169	1
		18-145	1	554-1970-005		11-181	1
554-1890-002		18-28	1	554-1971-002		11-21	1
554-1892-002		18-26	1	554-1972-002		11-18	1
554-1893-002		18-157	1	554-1973-002		11-168	4
554-1894-002		18-40	1	554-1977-003		11-92	1
554-1897-002		18-	1	554-1979-003		11-169	1
554-1900-003		19-10	1	554-1980-003		1-1	1
554-1904-003		18-	1	554-1981-002		13-92	1
554-1907-003		18-116	2	554-1987-002		13-161	2
		18-135	1	554-1992-002		13-90	4
554-1908-003		18-152	1	554-1995-003		13-94	1
554-1909-003		18-	1	554-1999-003		13-97	8
554-1910-003		18-	2	554-2001-003		13-95	8
554-1912-003		19-11	1	554-2006-003		13-76	4
554-1913-003		19-11	1	554-2010-003		13-98	4
554-1914-003		18-17	1	554-2012-00		13-85	4
554-1915-003		18-14	3	554-2020-005		13-157	1
554-1916-003		18-16	1	554-2021-005		13-71	1
554-1917-003		18-13	3	554-2022-005		13-2	1
554-1919-003		18-20	3	554-2023-00		14-3	1
554-1921-003		18-22	1	554-2024-002		14-45	1
554-1924-003		18-55	4	554-2025-002		14-67	1
554-1925-003		18-56	1	554-2028-005		14-70	1
554-1926-003		18-66	1	554-2029-005		14-61	1
554-1928-003		18-174	1	554-2030-002		10-52	4
554-1929-003		18-81	1			21-73	1
554-1930-003		18-76	1	554-2031-002		10-43	1
554-1931-003		19-2	1	554-2033-003		10-40	1
554-1932-003		19-2	1	554-2036-004		10-53	1
554-1933-003		18-124	1	554-2037-004		10-46	1
554-1934-003		18-140	1	554-2040-004		21-50	1
554-1935-003		18-94	1			22-	REF
554-1936-003		18-156	1	554-2042-003		21-93	1
554-1943-003		18-93	1	554-2046-002		21-94	1



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PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ	PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ
554-2048-002		21-45	10	554-2155-005		7-212	1
554-2050-002		2-23	2	554-2156-005		7-210	1
		14-16	2	554-2157-005		7-186	1
		21-71	2	554-2159-003		18-30	1
		21-74	1	554-2163-002		8-36	1
554-2055-003		21-8	1	554-2164-003		2-3	1
554-2056-003		1-2	1			8-17	1
554-2062-00		21-52	1			8-25	1
554-2063-003		21-11	1			8-48	1
554-2064-003		21-12	1			8-62	1
554-2066-004		21-7C	1			8-66	1
554-2068-004		21-24	1			8-81	1
554-2070-004		21-89	1	554-2167-005		8-173	1
554-2071-004		22-56	1	554-2168-005		8-171	1
554-2072-004		22-47	1	554-2169-005		8-151	1
554-2075-004		21-48B	1	554-2170-00		21-	1
554-2079-005		21-13	1	554-2171-00		21-	1
554-2081-005		21-14	1	554-2172-00		21-	1
554-2082-005		21-119	1	554-2173-00		21-	1
554-2083-005		21-103	1	554-2180-005		2-197	1
554-2085-002		9-7	1	554-2181-005		2-195	1
554-2088-004		9-17	1	554-2182-005		2-174	1
554-2091-004		14-6	3	554-2183-003		10-11	1
554-2101-003		10-17	2	554-2188-005		6-238	1
554-2103-004		1-5	1	554-2189-005		6-236	1
554-2105-002		11-180	1	554-2190-005		6-212	1
		13-24F	1	554-2204-002		21-75	1
		13-24G	1	554-2205-002		18-37	1
		13-160	1	554-2207-003		15-212	1
554-2109-003		18-59	2	554-2208-003		15-99	1
554-2111-002		18-64	1	554-2210-003		15-200	1
554-2113-002		18-43	2	554-2211-003		15-147	1
554-2119-004		12-65	1	554-2212-003		15-103	1
554-2121-004		12-75	1	554-2213-003		15-143	1
554-2143-004		12-5	1	554-2214-003		15-248	1
554-2144-002		15-138	2	554-2215-003		15-122	1
554-2148-002		2-193	1	554-2216-003		15-120	1
		7-209	2	554-2217-004		15-243	1
554-2149-002		2-102	2	554-2219-005		15-163	1
		6-146	2	554-2226-002		13-152	1
		6-147	2	554-2231-003		13-128	1
		6-148	2	554-2233-003		13-86	1
		6-150	2			13-87	1
		6-176	2			13-88	1
		7-141	2			13-89	1
		7-146	2	554-2238-002		19-3	1
		7-185	1	554-2239-003		21-69	1
		8-105	2	554-2240-002		15-252	2
		8-111A	2	554-2245-005		5-251	1
		8-112	2	554-2246-005		5-249	1
		8-143	2	554-2247-005		5-225	1
		8-148	2	554-2251-00		9-5	1
554-2150-002		2-47	1	554-2252-003		9-19	1
		7-65	6	554-2254-00		18-	1
		8-60	1	554-2260-002		11-17	1
		8-64	1	554-2263-005		11-170	1
		8-70	1				

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PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ	PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ
554-2267-003		15-53	1	554-6370-002		18-142	3
554-2269-004		15-7	1	554-6371-003		18-42	1
		16-	REF	554-6373-004		18-48	1
554-2274-002		12-55	1	554-6379-002		21-27	1
554-2276-002		12-54	1	554-6380-002		21-30	1
554-2277-002		12-49	1	554-6384-002		14-1	1
554-2278-003		12-52	1	554-6387-002		13-147	1
554-2279-003		11-91	1	554-6388-002		13-127	1
554-2280-003		11-83	1	554-6389-002		13-130	1
554-2820-001		23-16	1	554-6390-003		13-139	1
554-6305-002		13-110A	1	554-7189-00		3-131	1
		13-154B	1	554-7190-002		3-140	1
554-6306-002		21-76	1	554-7191-002		3-133	1
554-6309-002		18-9	4			23-130	1
554-6310-003		21-6	1	554-7192-002		3-138	1
554-6313-003		14-65	1	554-7193-002		3-1	1
554-6318-002		16-36	1	554-7200-003		3-71	1
554-6319-003		12-53	1	554-7201-003		3-142	1
554-6321-003		15-16	1	554-7203-004		3-19	1
554-6323-002		19-2A	1	554-7206-005		3-48	1
554-6325-003		19-2	1	600D126F150DE4		7-92	1
554-6327-003		18-90	1	600D157F060DM4		21-57	1
554-6328-004		18-91	1			21-58	1
		19-	REF	600D227G020DG4		6-120	1
554-6329-003		11-3	1	600D306G070DE4		21-63	1
554-6330-003		11-167	1			21-65	1
554-6331-002		13-159	1			21-68	1
554-6332-002		12-41	1	6080-1CC		21-107	2
554-6334-003		13-8	1	6229-41-01		3-154	1
554-6335-002		13-134	1	68-1660-26		2-27	2
554-6336-002		13-7	1			3-15	2
554-6337-002		13-12	1			5-41	2
554-6338-002		13-19	1			6-145	2
554-6339-002		13-21	1			7-30	2
554-6340-002		13-4	1			8-150	1
554-6341-002		13-24H	1			9-16	1
554-6342-002		13-24D	1			13-2A	2
554-6343-002		13-24E	1			13-111	2
554-6344-002		13-23	1			21-10	2
554-6345-002		13-24A	1			21-39	2
554-6347-002		13-15	1			21-45	10
554-6349-003		13-20	1			21-52	3
554-6350-003		13-22	1			21-89	2
554-6352-004		13-24J	1			22-27	2
554-6353-004		13-21A	1	68-1660-40		15-19	4
554-6355-002		13-10	1			18-62	1
554-6356-002		13-6	1			18-72	4
554-6360-003		13-3	1			18-77	2
554-6364-003		18-172A	3			18-103	2
554-6365-003		18-123	1			21-6	2
554-6366-003		18-	1			21-35	4
554-6367-003		18-119A	1			21-50	3
554-6368-002		18-96	2			21-69	2
554-6369-002		18-119B	1			21-76	2



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PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ	PART NUMBER	AIRLINE PART NO.	FIG. - ITEM	TTL REQ
68NM26		2-27	2	761-3535-001		23-21	1
		5-33	2	761-3536-001		23-31	1
		6-145	2	761-3538-001		23-151	1
		7-30	2	761-5187-001		21-7B	2
		8-150	2	761-5190-001		21-7A	2
		14-17	2	761-7852-001		23-4	1
7		1-3	1	761-7853-001		23-8	1
7077		13-5	1	761-7854-001		23-29	1
741-6268		3-127	1	761-7855-001		23-17	1
7486		13-5	1	761-7856-001		23-79	1
756-4438-002		3-140A	1	761-7857-001		23-46	1
756-7402-001		1-5A	1	761-7858-001		23-89	1
756-9769-001		23-96	1	763-3069-001		11-79A	3
757-1020-001		15-232	1			13-108A	2
757-3002-001		21-7	1			13-120A	2
757-3003-001		21-7A	1			13-153A	5
757-3017-001		21-81	1	763-5918-001		13-50A	1
757-3019-001		2-87A	1	763-6078-001		23-152	2
		7-17A	1	763F28		6-107	1
		7-91A	1	763F84		8-13	1
		10-17	2			8-24	1
		22-2A	2			8-50	1
757-3020-001		18-100	1	763F93		5-11	1
757-3079-001		5-41	1	763H6		11-42	1
757-3081-001		15-138	2	763H7		5-14	1
761-0006-003		13-134	1	77NM0612ZM3J		13-99	1
761-0015-003		18-58A	2	805-014X5V0103Z		11-24	1
761-3497-001		23-144	1			11-26	1
761-3498-001		23-47	1			11-73	1
761-3499-001		23-34	2			11-74	1
761-3500-001		23-69	1			11-111	1
		23-84	1			11-113	1
		23-102	1			11-115	1
761-3503-001		23-27	1			11-116	1
761-3505-001		23-111	3			11-118	1
761-3507-001		23-24	1			11-128	1
761-3508-001		23-13	1			11-140	1
761-3509-001		23-7	1			11-144	1
761-3511-003		23-39	1			11-148	1
761-3512-003		23-38	1			11-149	1
761-3513-001		23-48	1			11-156	1
		23-91	1			11-165	1
761-3514-001		23-49	1	855-502X5V0203Z		7-180	1
761-3515-001		23-44	1	905-45-55		21-46	1
761-3516-001		23-93	1	901-45-65		3-139	2
761-3519-001		23-51	1	911		21-47	1
761-3520-001		23-43	1	913-3010-00		2-107	1
761-3521-003		23-67	1	913-3942-00		11-16	1
761-3522-001		23-63	1			11-22	1
761-3523-003		23-61	1			11-25	1
761-3524-001		23-97	1			11-27	1
761-3525-001		23-100	1			11-33	1
761-3526-001		23-73	1			11-47	1
761-3527-003		23-58	1			11-48	1
761-3528-001		23-119	1			11-55A	1
761-3529-001		23-20	1			11-57	1
761-3530-003		23-82	1				
761-3531-001		23-135	1				
761-3532-001		23-75	1				
761-3532-002		23-94	1				

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A1C2	CL31CH1R5MP3	22-18
A1C3	600D306G070DE4	21-68
A1C4	600D157F060DM4	21-57
A1C5	CL21CH4R5TP3	22-11
A1C6	600D306G070DE4	21-63
A1C7	109D187X9025T2	21-67
A1C8	109D505C2050C2	22-40
A1C9	29F2135G2	21-66
A1C10	600D306G070DE4	21-65
A1C11	SDB1K04224M	21-87
A1C13	CL23CJ1R5TN3	22-39
A1C14	SDB1K02154M	21-28
A1C15	SDB1K02154M	21-29
A1CR1	1N2610	22-34
A1CR2	1N2610	22-38
A1CR3	1N2614	22-3
A1CR4	1N2614	22-46
A1CR5	1N1116	22-1
A1CR6	1N1116	22-2
A1CR7	1N753A	22-17
A1CR8	1N754A	22-22
A1CR9	1N2610	22-44
A1CR10	1N2610	22-43
A1CR11	1N2610	22-41
A1CR12	1N2610	22-45
A1CR13	1N2974RB	22-37
A1CR14	1N645	21-59
A1CR15	1N645	21-60
A1CR16	1N645	22-42
A1CR17	1N458	22-10
A1CR18	1N458	22-9
A1CR19	1N458	22-5
A1CR20	1N458	22-4
A1CR23	1N2610	21-86
A1CR25	1N645	21-87A
A1DL1	53-02C	21-64
A1E1 THRU A1E3	RTMT12-2M	21-95
A1E4 THRU A1E6	RTMT12M	21-22
A1E7	RTMT12-2M	21-95
A1E8	G4777-10	21-97
A1E9	TF300	21-87B
A1E10	RTMT12-2M	21-95
A1E11	RTMT12-2M	21-99
A1E12 THRU A1E15	RTMT12M	21-21
A1E16	RTMT12-2M	21-95
A1E18	G4777-10	21-97
A1E19	RTMT12-2M	21-95
A1E20	AB396-1	21-96
A1E21	G4777-10	21-97
A1E22	RTMT12-2M	21-95
A1E23, A1E24	AB396-1	21-96
A1E25, A1E26	RTMT12-2M	21-95
A1E27	G4777-10	21-9
A1E28	RTMT12-2M	21-36
A1E29	RTMT12M	21-16
A1E32	TF300	21-87B
A1F1	F02A250V1 1-2AS	21-84
A1F2	F02A250V1 1-2AS	21-91
A1F2	MDL1	21-91

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A1F4	F02A250V1 1-2AS	21-55
A1FL2	3JX37A	21-31
A1FL3	3JX37A	21-32
A1FL4	3JX37A	21-33
A1FL5	5197	21-4
A1J1	5197	21-4
A1J1	9723-1	21-102
A1J2	DCF37SC7	21-38
A1J3	DBF25SC7	21-40
A1J4	DBF25SC7	21-41
A1J5	DBF25SC7	21-42
A1J6	DBF25SC7	21-43
A1J7	DCF37SC7	21-44
A1J8	DDF50SC7	21-48
A1J9	5197	21-4
A1J10	UG1094/U	21-2
A1J11	UG1094/U	21-3
A1J12	SKT41BLK	21-104
A1J13	SKT41BLK	21-105
A1J14	SKT41BLK	21-106
A1J15	DAF15SC33	21-37A
A1K1	3SAH1127A2	21-81
A1L1	2500-62	21-88
A1L2	18-746	21-37
A1M1	K19203C4A	21-6
A1P1	DPA32-34P1	21-25
A1P2	DPA32-34P1	31-26
A1Q1	2N1488	21-72
A1Q2	2N697	22-31
A1Q3	2N697	22-32
A1Q4	2N1488	21-70
A1Q5	2N1488	21-74
A1Q6	2N657A	22-29
A1Q7	2N657A	22-30
A1Q8	2N1711	22-33
A1Q9	2N1711	22-28
A1R1	RN60C2151F	22-24
A1R2	RN60C1211F	22-16
A1R3	RN60C6190F	22-14
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A1R5	RN60C1781F	22-19
A1R6	RN60C3831F	22-15
A1R7	RN60C1781F	22-21
A1R8	RN60C2671F	22-20
A1R9	224L1-102	22-26
A1R10	RN60C1781F	22-23
A1R11	RW29V470	21-61
A1R12	RN60C1212F	22-6
A1R13	RN60C3161F	22-7
A1R14	RN60C3162F	22-8
A1R15	RN65C5623F	22-12
A1R16	RN60C2152F	22-13
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A1R18	RN60C2151F	21-77
A1R19	RN60C2151F	21-78
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A1T1	BC3237	21-20
A1T2	BC3236A	21-19
A1T3	BC3238	21-18
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A1XF1		357001	21-85	A2A1L3		MS16225-1	15-55
A1XF2		357001	21-92	A2A1L4		MS16225-1	15-56
A1XF3, A1XF4		357001	21-56	A2A1L5		MS16225-17	16-33
A1XK1		HRCC81M	21-82	A2A1L6		MS16225-11	16-31
A2CR11		1N2610	9-11	A2A1L7		MS16225-5	16-32
A2CR12		1N3284	9-8	A2A1L8		MS16225-5	16-35
A2R10, A2R11		RC20GF101K	9-9	A2A1P1		DC37PC7	14-17
A2R13		RC42GF100K	9-10	A2A1Q1		2N697	14-39
A2R14		RC20GF101K	9-9	A2A1Q2		2N697	14-41
A2T1		PL100984	9-12	A2A1Q3		2N697	14-42
A2A1B1		41A245	15-189	A2A1Q4		2N1488	14-15
A2A1C1		DM20F432J300WV	14-57	A2A1Q5		2N697	14-36
A2A1C2		KR047J35S	14-49	A2A1Q6		2N697	14-38
A2A1C3		917-1208-00	16-16	A2A1Q7		2N2362	16-14
A2A1C4		CM05F101J03	16-17	A2A1Q8		2N2362	16-2
A2A1C5		CC20CH180J	16-11	A2A1Q9		2N2360	16-8
A2A1C6		CK60AW102M	16-13	A2A1R1		RC07GF473K	14-24
A2A1C7		CM05F101J03	16-4	A2A1R2		RC07GF333K	14-51
A2A1C8		CM05F331J03	16-5	A2A1R3		RC07GF103K	14-50
A2A1C9		CM05F101J03	16-3	A2A1R4		RC07GF222K	14-40
A2A1C10		917-1215-00	16-26	A2A1R5		RE65G1820	14-43
A2A1C11		CK60AW102M	16-34	A2A1R6		RC07GF102K	14-48
A2A1C12		CK60AW102M	16-22	A2A1R7		RC07GF470K	14-14
A2A1C13		CK60AW102M	16-7	A2A1R8		RC07GF223K	14-10
A2A1C14		CK60AW102M	16-25	A2A1R9		RC07GF223K	14-21
A2A1C15		DM15F510J03	15-57	A2A1R10		RC07GF223K	14-9
A2A1C16		CM05F221J03	16-20	A2A1R11		RC07GF223K	14-22
A2A1C17		917-1212-00	16-21	A2A1R12		RC07GF222K	14-33
A2A1C18		CK60AW102M	16-29	A2A1R13		RC07GF471K	14-53
A2A1C19		917-1212-00	16-19	A2A1R14		RC07GF102K	14-34
A2A1C20		CK60AW102M	15-54A	A2A1R16		RC20GF182K	14-37
A2A1C21		CK60AW102M	16-36A	A2A1R17		RC07GF332K	14-35
A2A1CR1		1N458	14-29	A2A1R18		RC07GF103K	14-56
A2A1CR2		1N458	14-28	A2A1R19		RC07GF222K	14-30
A2A1CR3		1N458	14-27	A2A1R20		RC07GF821K	14-31
A2A1CR4		1N458	14-26	A2A1R21		RC07GF273K	14-32
A2A1CR5		1N458	14-19	A2A1R22		R471-61	17-13
A2A1CR6		1N458	14-13	A2A1R23		R471-61	17-7
A2A1CR7		1N458	14-18	A2A1R24		R471-62	17-8
A2A1CR8		1N458	14-12	A2A1R25		R471-62	17-24
A2A1CR9		1N2610	14-47	A2A1R26		R471-63	17-25
A2A1CR10		1N2610	14-46	A2A1R27		R471-63	17-3
A2A1CR11		1N2610	14-35	A2A1R28		R471-63	17-2
A2A1CR12		1N2610	14-4	A2A1R29		R471-63	17-1
A2A1CR13		1N2610	14-7	A2A1R30		R471-63	17-4
A2A1CR14		1N270	14-25	A2A1R31		R471-63	17-5
A2A1CR15		1N458	14-20	A2A1R32		R471-63	17-6
A2A1CR16		1N458	14-11	A2A1R33		R471-63	17-23
A2A1CR17		1N458	14-23	A2A1R34		R471-63	17-22
A2A1CR18		1N458	14-8	A2A1R35		R471-63	17-20
A2A1CR19		1N747A	15-128	A2A1R36		R471-63	17-21
A2A1CR20		FSR161	16-10	A2A1R37		R471-63	17-9
A2A1CR21		1N746A	14-52	A2A1R38		R471-64	17-10
A2A1CR23		1N648	15-105A	A2A1R39		R471-64	17-11
A2A1J1		DEF9SC7	18-158	A2A1R40		R471-64	17-12
A2A1J2		DAF15SC7	18-162	A2A1R41		R471-64	17-19
A2A1J3		DEF9SC7	18-158	A2A1R42		R471-64	17-18
A2A1K1		542-6735-003P	15-237	A2A1R43		R471-64	17-16
A2A1L1		MS16225-7	15-58	A2A1R44		R471-64	17-17



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A2A1R48		RC07GF333K	16-15
A2A1R49		RC07GF562K	16-12
A2A1R50		RC07GF221K	16-37
A2A1R51		RC07GF393K	16-1
A2A1R52		RC07GF333K	16-28
A2A1R53		RC07GF392K	16-39
A2A1R54		RC07GF221K	16-27
A2A1R55		RC07GF272K	16-24
A2A1R56		RC07GF820K	16-6
A2A1R57		RC07GF222K	16-23
A2A1R58		RC07GF392K	16-38
A2A1R59		RC07GF104K	14-55
A2A1R60		RC07GF220K	16-30
A2A1R61		RC07GF121K	16-7A
A2A1R62		RC07GF470K	15-105B
A2A1S8		231376AA	15-137
A2A1S8		269-2614-010	15-137
A2A1T1		94-0567-00	15-125
A2A1T2		94-0567-00	15-213
A2A1T3		411593	14-44
A2A1T4		01-901	16-9
A2A1TB1		554-1750-004	15-80
A2A1TB2		554-1752-004	15-73
A2A1TB3		554-1754-004	15-69
A2A1TB4		554-1756-004	15-65
A2A1TB5		554-1758-004	15-61
A2A1TB6		554-1745-004	15-59
A2A1TB7		554-1767-005	15-49
A2A1TB8		554-1743-004	15-18
A2A1TB9		554-1759-004	16-50
A2A1TB10		554-1730-003	17-26
A2A1XCR20		05-3307-01	16-41
A2A1XQ1 THRU A2A1XQ5		05-3307-51	14-62
A2A1XQ7 THRU A2A1XQ9		05-3307-01	16-41
A2A1Y1	MO-7940		15-34
A2A1Y2	MO-7941		15-33
A2A1Y3	MO-7942		15-32
A2A1Y4	MO-7943		15-31
A2A1Y5	MO-7944		15-30
A2A1Y6	MO-7945		15-29
A2A1Y7	MO-7946		15-28
A2A1Y8	MO-7947		15-27
A2A1Y9	MO-7948		15-26
A2A1Y10	MO-7949		15-25
A2A1Y11	CR76U32-80370MC		15-47
A2A1Y12	CR76U33-22040MC		15-46
A2A1Y13	CR76U33-63700MC		15-45
A2A1Y14	CR76U34-05370MC		15-44
A2A1Y15	CR76U34-47040MC		15-43
A2A1Y16	CR76U34-88700MC		15-42
A2A1Y17	CR76U35-30370MC		15-41
A2A1Y18	CR76U35-72040MC		15-40
A2A1Y19	CR76U36-13700MC		15-39
A2A1Y20	CR76U36-55370MC		15-38
A2A1Y21	CR76U36-97040MC		15-37

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A2A1Y22	CR76U37-38700MC		15-36
A2A1Y23	CR76U37-80370MC		15-35
A2A2C1	CC22SH120J		13-77
A2A2C2	CM05F151J03		13-78
A2A2C3	VC21G		13-72
A2A2C5	GA-33UUF0P0RM5PCT		13-79
A2A2C6	VC21G		13-73
A2A2C7	CC22SH120J		13-80
A2A2C8	GA-33UUF0P0RM5PCT		13-81
A2A2C9	VC21G		13-74
A2A2C10	CC22SH120J		13-82
A2A2C11	GA-33UUF0P0RM5PCT		13-83
A2A2C12	VC21G		13-75
A2A2C13	CC22SH120J		13-84
A2A2C14	CM05E750J03		13-101
A2A2C14	CM05F121J03		13-101
A2A2C15	CK60AW681M		13-30
A2A2C16	913-3942-00		13-102
A2A2C17	CK60AW821M		13-106
A2A2C18	538011E2P094R		13-108
A2A2C19	538011COP089R		13-107
A2A2C20	913-3942-00		13-115
A2A2C21	150D105X9035A2		13-50
A2A2C22	538011COP092R		13-112
A2A2C23	538011COP089R		13-120
A2A2C24	CK60AW681M		13-114
A2A2C25	913-3942-00		13-49
A2A2C26	538011E2P094R		13-148
A2A2C27	913-3942-00		13-35
A2A2C28	GA5-1UUF0P0RM5PCT		13-45
A2A2C28	GA6-2UUF0P0RM5PCT		13-45
A2A2C29	538011E2P094R		13-153
A2A2C30	913-3942-00		13-52
A2A2C31	CM05F101J03		13-44
A2A2C32	913-3942-00		13-54
A2A2C33	538011COP089R		13-140
A2A2C34	CM05F101J03		13-145
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A2A2C37	538011COP089R		13-142
A2A2C38	M23-500M		13-143
A2A2C39	M23-500M		13-138
A2A2C40	CM05F101J03		13-133
A2A2C41	538011COP089R		13-132
A2A2C42	M23-500M		13-131
A2A2C43	150D105X9035A2		13-56
A2A2C44	538011COP089R		13-129
A2A2C45	338011C0H0470J		13-122
A2A2C46	M206-1000M		13-118
A2A2C47	DA718-001		13-119
A2A2C48	DA718-001		13-117
A2A2C49	DA718-001		13-116
A2A2C50	CM05E300J03		13-25
A2A2C50	913-3942-00		13-25
A2A2C51	913-3942-00		13-103
A2A2C52	913-3942-00		13-39
A2A2C53	913-3942-00		13-59
A2A2C54	GA2-2UUF0P0RM5PCT		13-36
A2A2C55	913-3942-00		13-64
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A2A2C61		913-3942-00	13-101A	A2A2R13		RC07GF220K	13-55
A2A2C62		150D105X9035A2	13-28A	A2A2R13		RC07GF471K	13-55
A2A2C63		DM15C120J01	13-32A	A2A2R14		RW69V101	13-57
A2A2C64		GA3-3UUF0RM5PCT	13-26B	A2A2R14		RW69V820	13-57
A2A2CR1		MA4561	13-126	A2A2R15		RC07GF390K	13-60
A2A2CR2		MA4561	13-137	A2A2R16		RC07GF390K	13-62
A2A2J1		554-2105-002	13-160	A2A2R17		RW69V680	13-63
A2A2J2		554-2105-002	13-24G	A2A2R18		RN60D1963F	13-123
A2A2J3		554-2105-002	13-24F	A2A2R18		RN60D8252F	13-123
A2A2J4		554-6331-002	13-159	A2A2R19		RC20GF222K	13-67
A2A2L1		554-2233-003	13-86	A2A2R19		RN60D1961F	13-67
A2A2L2		554-2233-003	13-87	A2A2R19		RN65B1961F	13-67
A2A2L3		554-2233-003	13-88	A2A2R20		RC07GF470K	13-47
A2A2L4		554-2233-003	13-89	A2A2R21		RC07GF104J	13-69
A2A2L5		MS16225-9	13-27	A2A2R22		RC07GF470K	13-141
A2A2L6		MS16225-14	13-32	A2A2R23		RN60D1002F	13-125
A2A2L7		MS16225-2	13-109	A2A2R23		RN60G1002F	13-125
A2A2L8		MS16225-14	13-65	A2A2R23		RN60G3012F	13-125
A2A2L10		MS16225-14	13-53	A2A2R24		RC07GF100K	13-46A
A2A2L11		MS16225-1	13-41	A2A2R25		TITM1-4-100-10PCT	13-61B
A2A2L12		554-2226-002	13-152	A2A2R26		TITM1-4-100-10PCT	13-61A
A2A2L13		MS16224-11	13-51	A2A2T1		554-6390-003	13-139
A2A2L14		MS16225-14	13-43	A2A2T2		554-2231-003	13-128
A2A2L15		554-6389-002	13-130	A2A2V1		7077	13-5
A2A2L16		MS16225-14	13-61	A2A2V1		7486	13-5
A2A2L17		MS16224-11	13-58	A2A2V1		CD5900	13-6
A2A2L18		554-6388-002	13-127	A2A2XV1		554-6356-002	13-6
A2A2L19		MS16225-3	13-70	A2A2XV1		SKT14BRN	18-167
A2A2L20		MS16225-3	13-68	A2A3J1		SKT14RED	18-168
A2A2L21		MS16225-3	13-121	A2A3J2		SKT14ORN	18-169
A2A2L23		MS16225-2	13-26	A2A3J3		SKT14YEL	18-170
A2A2L23		MS16225-3	13-26A	A2A3J4		UG1465U	18-41
A2A2L24		554-6387-002	13-147	A2A3P1		RC07GF102K	18-112
A2A2L24		763-5918-001	13-50A	A2A3R3		RC07GF151K	18-113
A2A2L26		MS16225-9	13-66	A2A3R4		RC07GF102K	18-131
A2A2L27		MS16225-4	13-150	A2A3R5		RC07GF151K	18-132
A2A2L28		MS16225-14	13-48	A2A3R6		RC07GF102K	18-148
A2A2P1		DE9PC7	13-111	A2A3R7		RC07GF100K	18-149
A2A2Q1		2N2398	13-104	A2A3R8		ML7815	18-7
A2A2Q2		2N1142	13-110	A2A3V1 THRU			
A2A2Q2		2N1142	13-110	A2A3V4			
A2A2Q3		2N1142	13-154	A2A4C1		K15J20S	10-22
A2A2Q3		2N1142	13-154	A2A4C2		118P10302S4	10-12
A2A2Q4		2N1692	13-156	A2A4C3		118P10302S4	10-15
A2A2Q5		2N1692	13-149	A2A4C4		196P47456S26	10-41
A2A2Q6		2N1692	13-136	A2A4C5		196P47456S26	10-42
A2A2Q7		2N1692	13-135	A2A4C6		CM06F222J03	10-24A
A2A2R1		RC07GF471K	13-105	A2A4CR1		IN2613	10-27
A2A2R2		RC07GF102K	13-29	A2A4CR2		IN2613	10-36
A2A2R3		RC07GF122K	13-28	A2A4CR3		IN458	10-23
A2A2R4		RC07GF222K	13-100	A2A4CR3		IN648	10-23
A2A2R4		RC07GF332K	13-100	A2A4CR4		IN648	10-30
A2A2R5		RC07GF223K	13-33	A2A4CR5		IN458	10-24
A2A2R5		RC07GF822K	13-33	A2A4CR6		IN458	10-10
A2A2R6		RC07GF472K	13-31	A2A4CR7		IN458	10-8
A2A2R7		RC07GF152K	13-113	A2A4CR8		IN458	10-18
A2A2R8		RC07GF222K	13-37	A2A4CR9		W301A	10-17
A2A2R9		RC07GF272K	13-38	A2A4CR10		W301A	10-16
A2A2R10		RC07GF101K	13-40	A2A4CR13		IN458	10-25
A2A2R10		RC07GF330K	13-40	A2A4CR13		IN648	10-25
				A2A4CR14		IN458	10-1A



SYMBOL	LOCATION	PART NUMBER	FIG.-ITEM	SYMBOL	LOCATION	PART NUMBER	FIG.-ITEM
A2A4CR15		1N648	10-27A	A2A4R6		RC07GF223K	10-6
A2A4L1		MP206-14B	10-39	A2A4R7		RC07GF223K	10-3
A2A4L2		MP206-14B	10-38	A2A4R7		RC07GF223K	10-3A
A2A4P1		DA15PC7	10-33	A2A4R8		RC07GF102K	10-1
A2A4Q1		2N697	10-4	A2A4R8		RC07GF103K	10-1
A2A4Q2		2N697	10-5	A2A4R9		RC07GF102K	10-2A
A2A4Q3		2N706	10-5A	A2A4R9		RC07GF103K	10-2
A2A4R1		RC07GF121K	10-44	A2A4R9		RC07GF103K	10-2A
A2A4R2		RC20GF103K	10-32	A2A4R12		RS2C3R100J	10-13
A2A4R3		RC20GF103K	10-37	A2A4R12		RW69V1RO	10-13
A2A4R4		RC07GF223K	10-9	A2A4R12		RW69V2R2	10-13
A2A4R4		RC07GF563K	10-9	A2A4R15		RC07GF106K	10-29
A2A4R5		RC07GF223K	10-7	A2A4R16		RC07GF106K	10-28
A2A4R5		RC07GF563K	10-7	A2A4R17		RC20GF682K	10-26
				A2A4R18		RC20GF682K	10-31

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SYMBOL	LOCATION	PART NUMBER	FIG. - ITEM
A2A4R19		RC07GF224K	10-23A
A2A4R20		RC07GF334K	10-22A
A2A4R21		RC07GF471K	10-15A
A2A4R22		RC07GF472K	10-27C
A2A4R23		RC07GF682K	10-27B
A2A4R24		RC07GF152K	10-3B
A2A4R25		RC07GF152K	10-4A
A2A4XQ1, A2A4XQ2		05-3307-51	10-51
A2A5CR1		MA4127	12-51
A2A5J1		3012	12-57
A2A5P1		3000	12-42
A2A5R1		RC20GF560K	12-59
A2A6C1		913-3942-00	11-94
A2A6C2		CM05F220J03	11-23
A2A6C3		913-3942-00	11-16
A2A6C4		917-1215-00	11-166
A2A6C5		805-014X5V0103Z	11-26
A2A6C6		913-3942-00	11-22
A2A6C7		917-1215-00	11-162
A2A6C8		CM05E560J03	11-28
A2A6C9		CM05C120K03	11-29
A2A6C10		913-3942-00	11-25
A2A6C11		913-3942-00	11-27
A2A6C12		805-014X5V0103Z	11-24
A2A6C13		913-3942-00	11-163
A2A6C14		913-3942-00	11-33
A2A6C15		913-3942-00	11-164
A2A6C16		805-014X5V0103Z	11-165
A2A6C17		913-3942-00	11-47
A2A6C18		917-1215-00	11-143
A2A6C19		CM05E390J03	11-49
A2A6C20		CM05C180K03	11-52
A2A6C20		CM05F220J03	11-23
A2A6C21		913-3942-00	11-150
A2A6C22		913-3942-00	11-48
A2A6C23		805-014X5V0103Z	11-149
A2A6C24		913-3942-00	11-145
A2A6C25		917-1215-00	11-139
A2A6C26		CM05E390J03	11-137
A2A6C27		CM05E200J03	11-55
A2A6C28		913-3942-00	11-146
A2A6C29		913-3942-00	11-57
A2A6C30		805-014X5V0103Z	11-144
A2A6C31		538011E2P094R	11-69
A2A6C32		CM05E390J03	11-125
A2A6C33		CM05E200J03	11-126
A2A6C34		CK60AW102M	11-67
A2A6C35		805-014X5V0103Z	11-73
A2A6C36		CM05E680J03	11-134
A2A6C36		CM05F101J03	11-134
A2A6C37		805-014X5V0103Z	11-128
A2A6C38		913-3942-00	11-65
A2A6C39		CM05E200J03	11-131
A2A6C40		CK60AW102M	11-61
A2A6C40		CM05F221J03	11-61
A2A6C41		805-014X5V0103Z	11-118
A2A6C42		538011E2P094R	11-79
A2A6C43		805-014X5V0103Z	11-116
A2A6C44		805-014X5V0103Z	11-74
A2A6C45		DM15C100J01	11-120
A2A6C46		CM05F101J03	11-41
A2A6C47		805-014X5V0103Z	11-113
A2A6C48		805-014X5V0103Z	11-111
A2A6C49		538011E2P094R	11-36
A2A6C50		805-014X5V0103Z	11-156
A2A6C51		CM05F101J03	11-35

SYMBOL	LOCATION	PART NUMBER	FIG. - ITEM
A2A6C52		K2R2J20S	11-102
A2A6C53		K2R2J20S	11-8
A2A6C54		805-014X5V0103Z	11-115
A2A6C55		CM05E680J03	11-62
A2A6C56		CK60AW102M	11-135
A2A6C57		805-014X5V0103Z	11-148
A2A6C58		805-014X5V0103Z	11-140
A2A6C59		K2R2J20S	11-127
A2A6C60		CM05F391J03	11-107
A2A6C61		KR033J35S	11-7
A2A6C62		CM06F561J03	11-12
A2A6C63		CM05E470J03	11-58
A2A6C63		CM05F101J03	11-58
A2A6C64		913-3942-00	11-55A
A2A6C65		913-3942-00	11-132A
A2A6CR1		1N830A	11-100
A2A6CR2		SPLIN904	11-82
A2A6CR3		1N270	11-123
A2A6FL1		X690-2	11-154
A2A6FL2		X665-3	11-122
A2A6J1		SKT41BRN	11-89
A2A6J2		SKT41RED	11-88
A2A6J3		SKT41ORN	11-87
A2A6J4		SKT41YEL	11-86
A2A6J5		SKT41GRN	11-85
A2A6J6		SKT41BLU	11-84
A2A6J7		SKT41VIO	11-19
A2A6J8		554-2105-002	11-180
A2A6L1		MS16225-3	11-96
A2A6L2		554-2260-002	11-17
A2A6L3		MS16225-2	11-31
A2A6L4		MS16225-13	11-97
A2A6L5		MS16225-13	11-13
A2A6L6		MS16225-13	11-157
A2A6L7		MS16225-13	11-38
A2A6L8		MS16225-2	11-53
A2A6L9		MS16225-13	11-124
A2A6L10		MS16225-13	11-54
A2A6L11		MS16225-2	11-56
A2A6L12		MS16225-21	11-71
A2A6L13		MS16225-17	11-129
A2A6L14		MS16225-13	11-130
A2A6L15		MS16225-7	11-66
A2A6L16		MS16225-17	11-117
A2A6L17		MS16225-21	11-45
A2A6L18		MS16225-21	11-155
A2A6L19		MS16225-21	11-110
A2A6L20		MS16225-21	11-103
A2A6L21		MS16225-5	11-63
A2A6L22		2500-14	11-14
A2A6L23		2500-14	11-98
A2A6L24		MS16225-21	11-109
A2A6L25		MS16225-21	11-132B
A2A6P1		DE9PC7	11-4
A2A6Q1		2N2360	11-93
A2A6Q2		2N2360	11-160
A2A6Q3		2N2360	11-147
A2A6Q4		2N2360	11-141
A2A6Q5		2N2398	11-68
A2A6Q6		2N2360	11-76
A2A6Q7		2N2360	11-40
A2A6Q8		2N2362	11-64



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A2A6Q9		2N337	11-11	A3C9	7D	DM15F510J03	6-22
A2A6Q10		2N404A	11-9	A3C10	7D	DM15F510J03	6-17
A2A6Q11		2N337	11-6	A3C11	5C	CM05F221J03	6-89
A2A6Q12		2N1711	11-44	A3C12	11D	K2R2J35S	6-24
A2A6R1		RC07GF101K	11-15	A3C13	1B	CM05F221J03	6-2
A2A6R2		RC07GF102K	11-95	A3C14	3D	CM05F391J03	6-10
A2A6R3		RC07GF151K	11-161	A3C15	9E	K2R2J35S	6-21
A2A6R4		RC07GF102K	11-30	A3C16	8E	CM05F221J03	6-153
A2A6R5		RC07GF221K	11-46	A3C17	13E	109D686X0030F2	6-28
A2A6R6		RC07GF102K	11-151	A3C18	19F	150D124X9035A2	6-124
A2A6R7		RN65B1210F	11-76A	A3C19	21E	150D124X9035A2	6-39
A2A6R8		RC07GF221K	11-142	A3C20	21F	CL25BJ180UP3	6-123
A2A6R9		RN60D1000F	11-153	A3C21	23G	CL25BJ180UP3	6-119
A2A6R10		RC07GF102K	11-50	A3C22	25H	600D227G020DG4	6-120
A2A6R12		RC07GF102K	11-138	A3C23	5G	150D103X0035A2	6-140
A2A6R13		RC07GF101K	11-133	A3C24	5K	CM05F221J03	6-102
A2A6R14		RC07GF472K	11-70	A3C24	5K	DM15F510J03	6-102
A2A6R15		RC07GF392K	11-132	A3C25	7F	K2R2J35S	6-135
A2A6R16		RC07GF392K	11-60	A3C26	13F	CM05F241J03	6-130
A2A6R17		RN60C1471F	11-59	A3C26	13F	CM06F102J03	6-130
A2A6R18		RC07GF102K	11-72	A3C26	13F	CM06F751J03	6-130
A2A6R19		RC07GF101K	11-119	A3C26	13F	DM15F510J03	6-130
A2A6R20		RC07GF472K	11-75	A3C27	13F	CM05F241J03	6-131
A2A6R21		RC07GF272K	11-78	A3C27	13F	CM06F102J03	6-131
A2A6R22		RC07GF102K	11-77	A3C27	13F	CM06F751J03	6-131
A2A6R23		RC07GF332K	11-121	A3C27	13F	DM15F510J03	6-131
A2A6R24		RC07GF221K	11-39	A3C28	1F	CL25BG400UP3	6-93
A2A6R25		RC07GF221K	11-80	A3C29	1G	K2R2J35S	6-94
A2A6R26		RC07GF222K	11-112	A3C30	3H	CL25BG100UP3	6-101
A2A6R27		RC07GF392K	11-114	A3C31	10D	19C214	6-207
A2A6R28		RC07GF683K	11-43	A3C32	20F	K2R2J35S	6-161
A2A6R29		RC07GF822K	11-81	A3C33	16C	K2R2J35S	6-199
A2A6R30		RC07GF102K	11-10	A3C34	9K	K47J6S	6-111
A2A6R31		RC07GF183K	11-159	A3C35	2G	K10J20S	6-146A
A2A6R32		RC07GF182K	11-101	A3CR1	23D	1N270	6-46
A2A6R33		RC07GF473K	11-104	A3CR2	16D	1N751A	6-201
A2A6R34		RC07GF222K	11-32	A3CR3	23D	1N270	6-45
A2A6R35		RC20GF222K	11-152	A3CR4	24C	1N270	6-195
A2A6R36		RC07GF224K	11-106	A3CR5	26A	1N3713	6-192
A2A6R36		RC07GF474K	11-106	A3CR6	21C	1N270	6-60
A2A6R37		RC07GF103K	11-108	A3CR7	21D	1N270	6-42
A2A6R38		RC07GF473K	11-5	A3CR8	6C	1N270	6-209
A2A6R39		RC07GF682K	11-105	A3CR9	19C	SPLIN904	6-61
A2A6R40		RC07GF682K	11-99	A3CR10	19B	SPLIN904	6-62
A2A6R41		RC07GF102K	11-34	A3CR11	19B	1N270	6-65
A2A6R42		RC07GF220K	11-134A	A3CR12	14C	1N270	6-200
A2A6RT1		997F15	11-37	A3CR13	17D	1N3713	6-34
A2A6RT2		763H6	11-42	A3CR14	9C	1N270	6-81
A2A6RT3		997F15	11-51	A3CR15	9B	1N270	6-80
A2A6RT4		997F20	11-75A	A3CR16	17D	1N3713	6-35
A2A6XQ1 THRU		05-3307-01	11-172	A3CR17	17B	1N270	6-66
A2A6XQ8				A3CR18	7C	1N270	6-84
A2A6XQ9		05-3307-51	11-171	A3CR19	7C	1N270	6-85
A2A6XQ12				A3CR20	8A	1N270	6-182
A2A6Y1		CR55U52-30000MC	11-136	A3CR21	10A	1N270	6-183
A3C1	25D	K2R2J35S	6-47	A3CR22	4A	1N458	6-178
A3C2	25C	K2R2J35S	6-51	A3CR23	3C	1N270	6-6
A3C3	27B	K2R2J35S	6-53	A3CR24	2C	1N270	6-174
A3C4	23B	CM05F221J03	6-58	A3CR25	3C	1N270	6-7
A3C5	21C	CM05F221J03	6-49	A3CR26	4D	SPLIN904	6-172
A3C6	18C	CM05F151J03	6-198	A3CR27	1E	SPLIN904	6-12
A3C7	6B	55C23	6-181	A3CR28	8D	1N270	6-208
A3C8	6A	55C23	6-180				



SYMBOL	LOCATION	PART NUMBER	FIG. -ITEM	SYMBOL	LOCATION	PART NUMBER	FIG. -ITEM
A3CR29	9E	1N270	6-20	A3Q32	11K	2N697	6-112
A3CR30	9F	1N270	6-134	A3Q33	13K	2N657A	6-113
A3CR31	14E	1N270	6-158	A3R1	24C	RN60D1331F	6-196
A3CR32	15F	1N751A	6-129	A3R2	23D	RC07GF222K	6-44
A3CR33	6D	1N270	6-210	A3R3	15E	RW69V331	6-30
A3CR34	6F	1N270	6-151	A3R4	24B	RN60D4640F	6-194
A3CR35	1H	1N240	6-96	A3R5	23B	RC07GF472K	6-57
A3CR36	1K	1N270	6-99	A3R6	22A	RC07GF102K	6-191
A3CR37	4F	1N715A	6-152	A3R7	26A	RC07GF472K	6-193
A3CR38	3D	SPLIN904	6-9	A3R8	25B	RC07GF561K	6-55
A3CR39	11E	1N458	6-23	A3R9	27B	RC07GF472K	6-54
A3FL1	15G	20-0157-00	6-114	A3R10	21D	RC07GF682K	6-43
A3J1	2A	SKT41BRN	6-223	A3R11	22A	RC07GF472K	6-190
A3J2	2B	SKT41RED	6-222	A3R12	22A	RC07GF103K	6-189
A3J3	2C	SKT41ORD	6-221	A3R13	22C	RC07GF223K	6-197
A3J4	2D	SKT41YEL	6-220	A3R14	20B	RC07GF332K	6-188
A3J5	2D	SKT41GRN	6-219	A3R15	19D	RC07GF152K	6-38
A3J6	2E	SKT41BLU	6-218	A3R16	2B	224L1-203	6-176
A3J7	2F	SKT41VIO	6-217	A3R16	2B	224L1-503	6-176
A3J8	2F	SKT41GY	6-216	A3R17	20A	RC07GF473K	6-187
A3J9	2G	SKT41WHT	6-215	A3R18	19C	RC07GF332K	6-63
A3J10	2H	SKT41BLK	6-214	A3R19	19B	RC07GF222K	6-64
A3J11	2K	SKT41BRN	6-213	A3R20	17C	RC07GF271K	6-67
A3L1	5B	240-2158-00	6-88	A3R21	16B	RC07GF183K	6-184
A3L1	5B	240-2162-00	6-88	A6R22	15D	RN60D2151F	6-31
A3L2	7B	240-2114-00	6-86	A3R23	13D	RN60D3161F	6-27
A3L2	7B	240-2138-00	6-86	A3R24	13C	RN60D5110F	6-75
A3L3	1B	2500-14	6-3	A3R25	13B	RN60D2151F	6-74
A3L4	3C	2500-14	6-4	A3R26	15D	RN60D1001F	6-32
A3P1	27E	DB25PC7	6-145	A3R27	9C	RC07GF472K	6-79
A3Q1	27D	2N404A	6-48	A3R28	9B	RC07GF472K	6-82
A3Q2	25B	2N2048	6-56	A3R29	9B	RC07GF472K	6-78
A3Q3	27C	2N697	6-52	A3R30	15B	RN60D9091F	6-70
A3Q4	23C	2N337	6-50	A3R31	15C	RN60D1001F	6-71
A3Q5	19D	2N2048	6-40	A3R32	17D	RN60D1001F	6-37
A3Q6	21B	2N2048	6-59	A3R33	18A	RC07GF392K	6-186
A3Q7	17B	2N404A	6-68	A3R34	10C	RC07GF103K	6-204
A3Q8	13D	2N697	6-29	A3R35	11D	RC07GF473K	6-25
A3Q9	11C	2N404A	6-77	A3R36	5C	RC07GF222K	6-91
A3Q10	13C	2N2048	6-73	A3R37	6A	RC07GF472K	6-179
A3Q11	11B	2N404A	6-76	A3R38	7C	RC07GF472K	6-87
A3Q12	13B	2N2048	6-72	A3R39	7B	RC07GF121K	6-83
A3Q13	17C	2N404A	6-69	A3R40	5B	RC07GF472K	6-90
A3Q14	9D	2N2048	6-19	A3R41	2A	RC07GF222K	6-177
A3Q15	3B	2N337	6-1	A3R42	1C	RC07GF103K	6-5
A3Q16	1D	2N2048	6-8	A3R43	1E	RC07GF223K	6-11
A3Q17	5E	2N2048	6-13	A3R44	4C	RC07GF332K	6-173
A3Q18	7E	2N697	6-18	A3R45	4C	RC07GF152K	6-175
A3Q19	11F	2N404A	6-132	A3R46	3F	RN60D2612F	6-143
A3Q20	11E	2N337	6-26	A3R47	2D	RC07GF473K	6-171
A3Q21	17F	2N697	6-127	A3R48	5B	RC07GF332K	6-14
A3Q22	17E	2N404A	6-33	A3R49	5B	RC07GF472K	6-16
A3Q23	23E	2N697	6-41	A3R50	5E	RC07GF222K	6-15
A3Q24	23F	2N1711	6-122	A3R51	10B	RC07GF332K	6-205
A3Q26	23K	2N1711	6-118	A3R52	9F	RC07GF153K	6-133
A3Q27	21K	2N697	6-116	A3R53	10E	RC07GF272K	6-154
A3Q28	7H	2N337	6-105	A3R54	12E	RC07GF102K	6-155
A3Q29	5F	2N697	6-137	A3R55	14D	RC07GF472K	6-203
A3Q30	5G	2N404A	6-136	A3R56	12F	RC07GF472K	6-157
A3Q31	5K	2N404A	6-104	A3R57	12E	RC07GF472K	6-156



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SYMBOL	LOCATION	PART NUMBER	FIG. -ITEM	SYMBOL	LOCATION	PART NUMBER	FIG. -ITEM
A3R58	16E	RC07GF472K	6-160	A4C12	20F	151D235X0035B2	8-120
A3R59	14D	RC07GF561K	6-202	A4C13	22D	K3R3J35S	8-98
A3R60	17F	RC07GF122K	6-128	A4C14	4C	K22J15S	8-110
A3R60	17F	RC07GF821K	6-128	A4C15	1E	CD19F432F03	8-85
A3R61	19F	RN60D3161F	6-126	A4C16	17H	K3R3J35S	8-12
A3R62	19F	RC07GF102K	6-125	A4C17	26H	151D235X0035B2	8-122
A3R63	2E	224L1-502	6-150	A4C18	26E	K3R3J35S	8-115
A3R64	20E	RC07GF273K	6-162	A4C19	23F	K3R3J35S	8-33
A3R65	22E	RC07GF472K	6-163	A4C21	7K	CM05F391G03	8-6
A3R66	22E	RC07GF270K	6-164	A4C22	3K	K3R3J35S	8-3
A3R67	25F	RC07GF472K	6-121	A4C23	6H	CM05F391G03	8-142
A3R68	22F	RC07GF222K	6-165	A4C24	24G	K3R3J35S	8-121
A3R69	23G	RC07GF273K	6-117	A4C25	1G	K3R3J35S	8-43
A3R70	26H	RC07GF102K	6-168	A4C26	1H	151D235X0035B2	8-1
A3R71	26F	RN60D4641F	6-167	A4C27	9G	150D226X0035R2	8-45
A3R72	26H	RN60D1331F	6-169	A4C28	5G	150D226X0035R2	8-44
A3R73	24F	RN60D6811F	6-166	A4C29	11H	150D226X0035R2	8-7
A3R74	2F	224L1-501	6-148	A4C30	12G	CM05F391G03	8-137
A3R75	12F	RN60D56R2F	6-159	A4C32	16H	151D235X0035B2	8-131
A3R76	5F	RC07GF270K	6-139	A4C33	2G	CM05F221J03	8-144
A3R77	5G	RC07GF332K	6-138	A4C34	7D	CM05F221J03	8-69
A3R78	3K	RC07GF223K	6-100	A4C201	18A	151D505X0020B2	8-93C
A3R79	5H	RC07GF223K	6-103	A4C202	3D	150D476X0020R2	8-80A
A3R80	3G	RC07GF103K	6-141	A4C203	20B	K4R7J35S	8-98A
A3R81	7G	RC07GF471K	6-110	A4C204	20F	CM05F101J03	8-120B
A3R82	3F	RC07GF102K	6-142	A4CR1	16D	1N458	8-92
A3R83	2E	RC07GF153K	6-211	A4CR2	14F	1N756A	8-133
A3R84	4F	RC07GF271K	6-149	A4CR3	20D	1N458	8-96
A3R85	3G	RN60D4221F	6-95	A4CR4	20D	1N458	8-95
A3R86	1F	RC07GF152K	6-92	A4CR5	10D	1N756A	8-104
A3R87	1H	RC07GF472K	6-97	A4CR6	16F	1N746A	8-129
A3R88	1K	RC07GF332K	6-98	A4CR7	26F	1N458	8-119
A3R89	2G	224L1-102	6-147	A4CR8	26F	1N458	8-118
A3R90	7K	RC07GF103K	6-108	A4CR9	19K	1N458	8-15
A3R91	7K	RC07GF222K	6-106	A4CR10	19K	1N458	8-14
A3R92	2H	224L1-202	6-146	A4CR11	21G	1N964B	8-19A
A3R93	9K	RC07GF101K	6-109	A4CR12	22G	1N458	8-120A
A3R94	20K	RC07GF151K	6-170	A4CR201	22B	1N458	8-94A
A3R94	20K	RC07GF221K	6-170	A4CR202	24B	1N458	8-94B
A3R95	16A	MF1-8	6-185	A4CR203	26B	1N458	8-94D
		5-11K1PCTT7		A4CR204	24B	1N458	8-94C
A3R96	12D	RC07GF222K	6-206	A4CR205	24B	1N967B	8-94F
A3RT1	7G	763F28	6-107	A4CR206	26B	1N966B	8-100A
A3T1	19E	T1328	6-36	A4CR207	4B	1N458	8-112A
A3T2	17K	A14352	6-115	A4FL1	23C	D10456	8-51
A3XQ1 THRU		05-3307-51	6-237	A4J1	2A	SKT41BRN	8-160
A3XQ24				A4J2	2B	SKT41RED	8-162
A3XQ26 THRU		05-3307-51	6-237	A4J3	2C	SKT410RN	8-163
A3XQ33				A4J4	2D	SKT41YEL	8-164
A4C1	10A	150D273X9035A2	8-88	A4J5	2D	SKT41GRN	8-165
A4C2	17D	CD19F472F03	8-65	A4J6	2E	SKT41BLU	8-166
A4C3	10A	K3R3J35S	8-87	A4J7	2F	SKT41VIO	8-167
A4C4	15D	K1J35S	8-58	A4J8	2F	SKT41GY	8-168
A4C5	21D	K3R3J35S	8-52	A4J9	2G	SKT41WHT	8-169
A4C6	7D	K3R3J35S	8-83	A4J10	2H	SKT41BLK	8-170
A4C7	9C	150D155X0035B2	8-72	A4J11	2K	SKT41BRN	8-161
A4C8	13C	DM30F103F03	8-71	A4L1	11B	DL644	8-67
A4C9	1C	151D235X0035B2	8-80	A4L2	11E	DL107	8-63
A4C10	14C	151D235X0035B2	8-91	A4L3	13F	DL108	8-36
A4C11	17E	DM30F562F03	8-61	A4L4	21E	DL107	8-49



SYMBOL	LOCATION	PART NUMBER	FIG. -ITEM	SYMBOL	LOCATION	PART NUMBER	FIG. -ITEM
A4L5	17F	2500-62	8-35	A4R30	7F	RC07GF104K	8-39
A4L6	5D	DL107	8-82	A4R31	8E	RC07GF472K	8-149
A4L7	23H	DL107	8-18	A4R32	12D	RC07GF822K	8-101
A4L8	27H	2500-62	8-23	A4R33	10E	RC07GF152K	8-136
A4L9	23K	DL107	8-26	A4R34	10D	RC07GF222K	8-102
A4L10	15K	2500-62	8-10	A4R35	10D	RC07GF331K	8-103
A4P1	26E	DB25PC7	8-150	A4R36	26E	RC07GF101K	8-117
A4Q1	17C	2N697	8-57	A4R37	17G	RC07GF272K	8-30
A4Q2	7C	2N697	8-73	A4R38	26E	RC07GF103K	8-116
A4Q3		2N1711	8-74	A4R39	26D	RC07GF101K	8-100
A4Q4	3B	2N1711	8-77	A4R40	25K	RC07GF101K	8-22
A4Q5	9D	2N697	8-68	A4R41	25H	763F84	8-24
A4Q6		2N1711	8-29	A4R42	23G	RC07GF472K	8-28
A4Q7	23G	2N1711	8-21	A4R43	24E	RC07GF101K	8-114
A4Q8	23F	2N2048	8-34	A4R44	2H	224L1-103	8-143
A4Q9	7E	2N697	8-84	A4R45	5K	MF1-8	8-5
A4Q10	7F	2N1711	8-38			95-3K1PCTT7	
A4Q11	7G	2N1711	8-41	A4R46	5K	MF1-8	8-4
A4Q12	9F	2N404A	8-37			61-9K1PCTT7	
A4Q13	15G	2N697	8-31	A4R47	22G	RC07GF222K	8-127
A4Q14	25G	2N2048	8-27	A4R48	22H	RC07GF153K	8-126
A4Q15	3H	2N1711	8-47	A4R49	1K	RC07GF104K	8-2
A4Q16	3G	2N697	8-42	A4R50	22H	RC07GF222K	8-125
A4Q17	7H	2N697	8-46	A4R51	24H	RC07GF472K	8-123
A4Q18		2N1711	8-40	A4R52	24H	RC07GF182K	8-124
A4Q19	15H	2N697	8-11	A4R53	2F	RC07GF682K	8-146
A4Q20	19H	2N2048	8-19	A4R54	10G	RC07GF103K	8-139
A4Q201	13K	2N1711	8-9A	A4R55	4F	RC07GF682K	8-147
A4Q202	21F	2N1711	8-35A	A4R56	4F	RC07GF103K	8-145
A4R1	12A	RC07GF393K	8-90	A4R57	8H	RC07GF392K	8-141
A4R2	12A	RC07GF822K	8-89	A4R58	8G	RC07GF822K	8-140
A4R3	17C	RN60D5112F	8-55	A4R59	12G	RC07GF102K	8-138
A4R4	17D	RC07GF103K	8-54	A4R60	13H	RC07GF562K	8-9
A4R5	17D	RC07GF101K	8-53	A4R61	11H	RC07GF122K	8-8
A4R6	16C	RC07GF272K	8-93	A4R62	14H	RC07GF472K	8-134
A4R7	15D	RC07GF101K	8-59	A4R63	19K	RC07GF103K	8-16
A4R8	8C	RC07GF683K	8-108	A4R64	16K	RC07GF101K	8-132
A4R9	6C	RC07GF333K	8-109	A4R65	17K	763F84	8-13
A4R10	8B	RC07GF222K	8-113	A4R66	16G	RC07GF472K	8-130
A4R11	2B	224L1-103	8-112	A4R67	20H	RC20GF332K	8-127A
A4R12	1C	MF1-8	8-79	A4R201	9H	TITM1-4 3900-5PCT	8-6A
		5-11K1PCTT7		A4R202	16B	RC07GF222K	8-92A
A4R13	5B	RC07GF104K	8-75	A4R203	20B	RC07GF103K	8-93B
A4R14	1B	RC07GF222K	8-78	A4R204	2D	224L1-502	8-111A
A4R15	8C	RC07GF222K	8-107	A4R205	22B	RC07GF272K	8-93A
A4R16	12E	MF1-8	8-135	A4R206	18C	RC07GF224K	8-92B
		8-75K1PCTT7		A4R207	26B	RC07GF393K	8-94E
A4R17	2E	224L1-502	8-148	A4R208	24H	RC07GF393K	8-122A
A4R18	20G	RC07GF104K	8-128	A4R209	24B	RC07GF273K	8-99A
A4R19	19H	RC07GF222K	8-20	A4R210	2A	RC07GF183K	8-112B
A4R20	18D	RC07GF103K	8-94	A4R211	4B	RC07GF183K	8-112C
A4R21	13G	RC07GF101K	8-32	A4XQ1	THRU	05-3307-51	8-172
A4R22	19E	763F84	8-50	A4XQ20			
A4R23	20D	RC07GF472K	8-97	A4XQ201, A4XQ202		195-207	8-151A
A4R24	22D	RC07GF101K	8-99	A4Y1	25B	JKJH17T82	8-56
A4R25	4C	RC07GF102K	8-111	A5C1	19K	DM30F123F03	7-77
A4R26	5C	RC07GF103K	8-76	A5C2	23K	CM05F391J03	7-80
A4R27	8D	RC07GF222K	8-106	A5C3	21D	CM05F221J03	7-22
A4R28	2D	224L1-502	8-105	A5C4	27B	151D235X0035B2	7-34
A4R29	5E	MF1-8	8-86	A5C6	22C	151D235X0035B2	7-171
		1K1PCTT7					



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SYMBOL	LOCATION	PART NUMBER	FIG. -ITEM	SYMBOL	LOCATION	PART NUMBER	FIG. -ITEM
A5C7	16C	151D235X0035B2	7-174	A5CR26	13E	1N458	7-12
A5C8	3H	DM42F403F03	7-66	A5CR27	12C	1N270	7-178
A5C9	2H	CM06F182J03	7-144	A5CR27	12C	1N458	7-178
A5C11	7H	CL37BQ010MN3	7-67	A5CR28	16G	1N458	7-132
A5C12	18E	K10J20S	7-115	A5CR29	18G	1N270	7-131
A5C13	16A	CD19F332F03	7-157	A5CR29	18G	1N458	7-131
A5C14	22A	CM06F152J03	7-162	A5CR30	19H	1N458	7-78
A5C15	15C	K10J20S	7-16	A5CR31	16F	1N458	7-114
A5C16	26F	K10J20S	7-121	A5CR32	13B	1N270	7-54
A5C17	23F	DM30F203F03	7-86	A5CR33	13B	1N270	7-53
A5C18	12F	CM06F821J03	7-109	A5CR34	3B	1N458	7-60
A5C20	13H	CM07F103J03	7-73	A5CR35	1D	1N458	7-64
A5C21	12K	150D684X0035A2	7-137	A5CR36	2E	1N458	7-102
A5C22	14H	151D114X0035A2	7-133	A5CR37	26E	1N458	7-122
A5C23	11F	600D126F150DE4	7-92	A5J1	2A	SKT41BRN	7-192
A5C24	16C	151D235X0035B2	7-175	A5J2	2B	SKT41RED	7-191
A5C25	23H	DM30F203F03	7-85	A5J3	2C	SKT41ORN	7-190
A5C26	22G	151D114X0035A2	7-118	A5J4	2D	SKT41YEL	7-189
A5C27	10A	151D235X0035B2	7-152	A5J5	2D	SKT41GRN	7-188
A5C28	9A	CM06F472J03	7-58	A5J6	2E	SKT41ORN	7-187
A5C29	13C	CL27BJ100TN3	7-13	A5J7	2F	SKT41VIO	7-197
A5C30	20G	150D135X0035B2	7-128	A5J8	2F	SKT41GY	7-196
A5C31	12A	K1J35S	7-156	A5J9	2G	SKT41WHT	7-195
A5C32	2F	K10J20S	7-101	A5J10	2H	SKT41BLK	7-194
A5C33	8D	855-502X5V0203Z	7-180	A5J11	2K	SKT14BRN	7-193
A5C34	6C	CL25BG100UP3	7-150	A5P1	27E	DB25PC7	7-30
A5C35	5C	196P22451S2	7-3	A5Q1	27H	2N2405	7-83
A5C36	3F	CM07F822J03	7-100	A5Q2	25K	2N2405	7-82
A5C37	7D	150D475X0050B2	7-5	A5Q3	25B	2N697	7-36
A5C38	23K	CM05F220J03	7-125A	A5Q4	23C	2N697	7-37
A5C39	27K	CM05F241J03	7-82A	A5Q5	5G	2N2405	7-99
A5C40	14G	DM10F331J	7-73A	A5Q6	7F	2N2405	7-95
A5CR1	24K	1N459	7-125	A5Q7	19B	2N697	7-46
A5CR2	26D	1N458	7-169	A5Q8	17C	2N697	7-47
A5CR3	27B	1N270	7-35	A5Q9	11C	2N1132	7-56
A5CR3	27B	1N458	7-35	A5Q10	25E	2N697	7-27
A5CR4	25C	1N270	7-32	A5Q11	21E	2N697	7-21
A5CR4	25C	1N458	7-32	A5Q12	11E	2N697	7-10
A5CR5	7K	1N459	7-68	A5Q13	9H	2N697	7-70
A5CR6	8G	1N459	7-138	A5Q14	11K	2N697	7-71
A5CR7	2K	1N459	7-142	A5Q15	17H	2N697	7-76
A5CR8	7G	1N459	7-96	A5Q16	17G	2N697	7-87
A5CR9	14D	1N751A	7-176	A5Q17	3B	2N404A	7-62
A5CR10	24B	1N270	7-163	A5Q18	5F	2N1711	7-98
A5CR10	24B	1N458	7-163	A5Q19	7E	2N1711	7-6
A5CR11	23B	1N270	7-38	A5Q20	3E	2N1711	7-2
A5CR11	23B	1N458	7-38	A5R1	26F	RC07GF273K	7-120
A5CR12	21C	1N270	7-40	A5R2	23K	MF1-4T7-511K1PCT	7-79
A5CR12	21C	1N458	7-40	A5R3	23K	RC07GF224K	7-81
A5CR13	17B	1N458	7-48	A5R4	26H	RC07GF104K	7-123
A5CR14	19C	1N458	7-44	A5R5	26D	RC07GF824K	7-168
A5CR15	27C	1N270	7-33	A5R6	21E	RC07GF104K	7-23
A5CR15	27C	1N458	7-33	A5R7	26A	RC07GF183K	7-164
A5CR16	23E	1N458	7-24	A5R8	23C	RC07GF100K	7-31
A5CR17	10F	SPLIN459	7-108	A5R8	23C	RC07GF102K	7-31
A5CR17	10F	1N459	7-108	A5R9	26B	RC07GF103K	7-166
A5CR18	16F	1N270	7-113	A5R10	26A	RC07GF822K	7-165
A5CR19	13F	1N2989B	7-91	A5R11	6K	RC07GF181K	7-139
A5CR20	17E	1N2999B	7-17	A5R12	6G	RC07GF181K	7-105
A5CR21	15B	1N458	7-51	A5R13	6H	MF1-8 75K1PCTT7	7-140
A5CR22	17B	1N458	7-18	A5R14	2G	224L1-203	7-141
A5CR23	15H	1N458	7-75	A5R15	2K	RN60D2151F	7-143
A5CR24	12A	1N270	7-155	A5R16	24H	RC07GF154K	7-124
A5CR25	13E	1N458	7-15	A5R17	9E	RC07GF473K	7-8
A5CR26	13E	1N270	7-12				

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SYMBOL	LOCATION	PART NUMBER	FIG. -ITEM	SYMBOL	LOCATION	PART NUMBER	FIG. -ITEM
A5R18	8G	RC07GF102K	7-106	A5R75	6E	RC07GF472K	7-182
A5R19	14E	RC07GF472K	7-111	A5R76	8C	RC07GF332K	7-181
A5R20	21B	RC07GF822K	7-39	A5R77	10C	RC07GF101K	7-179
A5R21	22B	RC07GF103K	7-161	A5R78	2B	224L1-503	7-146
A5R22	21B	RC07GF183K	7-42	A5R79	5B	TITM1-4	7-61
A5R23	20B	RC07GF222K	7-160			8-2KPORM10PCT	
A5R24	19B	RC07GF472K	7-43	A5R80	1C	MEA274-000F	7-63
A5R25	19C	RC07GF103K	7-41	A5R80	1C	RN60D2613F	7-63
A5R26	18A	RC07GF222K	7-158	A5R81	5B	RN60D3832F	7-59
A5R27	25E	RC07GF101K	7-29	A5R82	6C	TITM1-4	7-147
A5R28	25D	RC07GF153K	7-28			1-8KPORM10PCT	
A5R29	24E	RC07GF222K	7-119	A5R83	2C	224L1-203	7-185
A5R30	23D	RC07GF472K	7-26	A5R84	1E	RC07GF334K	7-1
A5R31	22D	RC07GF103K	7-172	A5R85	3E	RC07GF103K	7-4
A5R32	11H	RC07GF273K	7-72	A5R86	4D	RC07GF392K	7-184
A5R33	15G	RC07GF123K	7-90	A5R87	4E	RN60D6192F	7-103
A5R34	10F	RC07GF334K	7-107	A5R87	4E	RN60D7152F	7-103
A5R35	7G	RN60D9091F	7-94	A5R88	9D	RC07GF472K	7-9
A5R36	14F	RC07GF472K	7-110	A5R88	3B	RC07GF472K	7-145
A5R37	11F	RC07GF681K	7-93	A5R89	24D	RC07GF103K	7-170
A5R37	11F	RC32GF681K	7-93	A5R90	2A	RC07GF183K	7-149
A5R38	25G	RC32GF272K	7-84	A5XQ1	THRU A5XQ20	05-3307-51	7-211
A5R38	25G	47682DET2550	7-84	A6C1	21F	STA552-1	5-81
A5R39	12K	RC07GF273K	7-136	A6C2	22E	CM06F272G03	5-209
A5R40	9K	RC07GF103K	7-69	A6C3	25D	CM05F181J03	5-30
A5R41	15K	RC07GF104K	7-74	A6C4	18B	STA552-1	5-189
A5R42	12H	RC07GF103K	7-135	A6C5	18D	CM06F242J03	5-211
A5R43	23D	RN60D2372F	7-25	A6C6	15F	196P82351S4	5-18
A5R44	19F	RC07GF472K	7-88	A6C7	18A	STA552-1	5-188
A5R45	20D	RC07GF273K	7-173	A6C8	14B	STA552-1	5-182
A5R46	18B	RC07GF474K	7-159	A6C9	4B	CM06F511J03	5-169
A5R47	19D	RC07GF273K	7-20	A6C10	26B	DM10F101J	5-203
A5R48	17B	MF1-8 20K1PCTT7	7-49	A6C11	27B	K10J20S	5-34
A5R48	17B	MF1800V21501F	7-49	A6C12	25C	K2R2J35S	5-31
A5R49	15B	RC07GF473K	7-50	A6C13	17B	118P47492S4	5-40
A5R50	15B	RC07GF472K	7-52	A6C15	9H	109D107X0025F2	5-64
A5R51	19C	RC07GF101K	7-45	A6C17	15K	109D476X0050F2	5-68
A5R52	19D	RC07GF104K	7-19	A6C18	25H	109D686X0030F2	5-78
A5R53	11D	RN60D1962F	7-7	A6C19	7F	150D476X0020R2	5-100
A5R54	11D	RC07GF273K	7-11	A6C20	26G	K2R2J35S	5-135
A5R55	14F	RC07GF152K	7-112	A6C21	26D	K2R2J35S	5-204
A5R56	14H	MF1-8 14-7K1PCTT7	7-134	A6C22	17G	150D223X0035A2	5-69
A5R57	20G	RC07GF103K	7-127	A6C23	18G	K1J35S	5-142
A5R58	20H	RC07GF104K	7-129	A6C24	5C	196P82351S4	5-2
A5R59	18E	RC07GF272K	7-116	A6C25	5D	CL27BE100UN3	5-5
A5R60	22H	RC07GF153K	7-126	A6C26	2E	CM06F821J03	5-105
A5R61	20H	RC07GF153K	7-130	A6C27	1F	SDB1K01102M	5-6
A5R62	20F	RC07GF152K	7-117	A6C28	3F	CK63AW103M	5-103
A5R63	17G	RC07GF183K	7-89	A6C29	2F	CK63AW103M	5-106
A5R64	13E	RC07GF153K	7-14	A6C30	1H	CL21CJ030TP3	5-57
A5R65	12D	RC07GF822K	7-177	A6C31	6G	K2R2J35S	5-163
A5R66	6C	RC07GF472K	7-183	A6C32	5G	150D476X0020R2	5-62
A5R67	11B	RC07GF103K	7-55	A6C33	26E	150D223X0035A2	5-130
A5R67	11B	RC07GF562K	7-55	A6C34	13A	K1J35S	5-44
A5R68	11B	RC07GF821K	7-57	A6C35	13C	150D476X0020R2	5-45
A5R69	10A	RC07GF103K	7-154	A6C36	22G	K1J35S	5-78A
A5R70	8A	RC07GF392K	7-151	A6CR1	22D	1N198	5-210
A5R71	10B	RC07GF103K	7-153	A6CR2	23D	1N458	5-29
A5R72	4A	RC07GF683K	7-148	A6CR3	18C	1N198	5-212
A5R73	7F	RC07GF101K	7-97	A6CR4	16B	1N270	5-187
A5R74	6F	RC07GF104K	7-104	A6CR5	16B	1N270	5-185



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SYMBOL	LOCATION	PART NUMBER	FIG. -ITEM	SYMBOL	LOCATION	PART NUMBER	FIG. -ITEM
A6CR6	16B	1N270	5-184	A6J7	2F	SKT41VIO	5-232
A6CR7	6A	1N270	5-172	A6J8	2F	SKT41GY	5-231
A6CR8	6A	1N270	5-174	A6J9	2G	SKT41WHT	5-230
A6CR9	4A	1N751A	5-171	A6J10	2H	SKT41BLK	5-229
A6CR10	3B	1N751A	5-53	A6J11	2K	SKT41BRN	5-228
A6CR11	4A	1N751A	5-170	A6L1	14C	2500-28	5-213
A6CR12	3B	1N751A	5-54	A6P1	27E	DB25PC7	5-32
A6CR13	1B	1N643	5-1	A6Q1	23E	2N697	5-28
A6CR14	2A	1N643	5-168	A6Q2	23C	2N697	5-39
A6CR15	1B	1N643	5-55	A6Q3	19D	2N697	5-24
A6CR16	2A	1N643	5-167	A6Q4	17F	2N697	5-87
A6CR17	6B	1N270	5-173	A6Q5	17G	2N697	5-88
A6CR18	26B	1N270	5-201	A6Q6	15D	2N697	5-19
A6CR19	24A	1N270	5-200	A6Q7	9C	2N697	5-49
A6CR20	24A	1N270	5-199	A6Q8	23B	2N697	5-38
A6CR21	12B	1N458	5-179	A6Q9	13D	2N1711	5-15
A6CR22	12D	1N458	5-214	A6Q10	13E	2N1711	5-16
A6CR23	2H	1N458	5-166	A6Q11	11F	2N1711	5-93
A6CR24	22G	1N458	5-139	A6Q12	11K	2N1711	5-65
A6CR25	16H	1N458	5-148	A6Q13	7K	2N404A	5-63
A6CR27	12H	1N458	5-153	A6Q14	9B	2N697	5-48
A6CR28	14H	1N458	5-149	A6Q15	23K	2N1711	5-75
A6CR29	8F	1N458	5-112	A6Q16	7F	2N697	5-99
A6CR30	8G	1N458	5-160	A6Q17	11G	2N404A	5-94
A6CR31	12A	1N458	5-178	A6Q18	13H	2N697	5-66
A6CR32	17G	1N458	5-89	A6Q19	23G	2N697	5-79
A6CR34	26H	1N458	5-136	A6Q20	9D	2N2386	5-13
A6CR35	10E	1N458	5-115	A6Q21	9E	2N697	5-12
A6CR36	6F	1N458	5-109	A6Q22	19F	2N697	5-83
A6CR37	6F	1N458	5-111	A6Q23	23H	2N697	5-76
A6CR39	14F	1N458	5-120	A6Q24	19K	2N697	5-71
AC6R40	11G	1N458	5-95	A6Q25	3H	2N1711	5-60
A6CR41	12H	1N458	5-154	A6Q26	3K	2N1711	5-59
A6CR42	18H	1N458	5-144	A6R1	24D	RC07GF104K	5-208
A6CR43	10F	1N270	5-116	A6R2	21D	RC07GF152K	5-27
A6CR44	10D	1N458	5-216	A6R3	24D	RN60D1052F	5-207
A6CR44	10D	1N964B	5-216	A6R3	24D	RN60D1102F	5-207
A6CR45	8D	1N458	5-217	A6R4	20B	RC07GF152K	5-195
A6CR45	12C	1N458	5-217A	A6R5	24B	RC07GF272K	5-198
A6CR46	5F	1N458	5-102	A6R6	21D	RC07GF103K	5-26
A6CR47	5E	1N458	5-8	A6R7	21E	RC07GF104K	5-25
A6CR48	5E	1N458	5-9	A6R8	18A	RC07GF153K	5-191
A6CR49	5F	1N458	5-101	A6R9	17D	RC07GF183K	5-21
A6CR50	24E	1N198	5-126	A6R10	17E	RC07GF153K	5-20
A6CR51	23F	1N458	5-80	A6R11	17E	RC07GF153K	5-22
A6CR52	24F	1N198	5-132	A6R12	15G	RC07GF473K	5-90
A6CR53	21H	2N877	5-72	A6R13	15G	RC07GF102K	5-91
A6CR54	4C	1N458	5-223	A6R14	18A	RC07GF153K	5-190
A6CR55	4C	1N458	5-222	A6R15	14B	RC07GF103K	5-181
A6CR56	15B	2N877	5-42	A6R16	14B	RC07GF103K	5-183
A6CR57	3C	1N270	5-169A	A6R17	4C	RC07GF102K	5-224
A6CR58	26C	1N3020B	5-206	A6R18	26A	RC07GF101K	5-202
A6CR59	14H	1N458	5-150	A6R19	8A	RC07GF272K	5-175
A6CR60	20F	1N458	5-125	A6R20	5B	RC07GF471K	5-52
A6CR61	21G	1N756A	5-84	A6R21	27B	RC07GF223K	5-35
A6CR62	24F	1N458	5-127	A6R22	23C	RC07GF153K	5-37
A6G1	3E	NS1018	5-7	A6R23	22A	RC07GF102K	5-197
A6J1	2A	SKT41BRN	5-238	A6R24	20A	RC07GF121K	5-196
A6J2	2B	SKT41RED	5-237	A6R25	12B	RC07GF154K	5-180
A6J3	2C	SKT41ORN	5-236	A6R26	12B	RC07GF103K	5-177
A6J4	2D	SKT41YEL	5-235	A6R27	11E	RN65B6190F	5-96
A6J5	2D	SKT41GRN	5-234	A6R28	9E	RN65B2151F	5-97
A6J6	2E	SKT41BLU	5-233	A6R29	10E	RN60D4640F	5-117



SYMBOL	LOCATION	PART NUMBER	FIG. -ITEM	SYMBOL	LOCATION	PART NUMBER	FIG. -ITEM
A6R30	14E	RC07GF102K	5-119	A6R90	20A	RC07GF472K	5-194
A6R31	12F	RC07GF472K	5-118	A6R91	20A	RC07GF102K	5-193
A6R32	13G	RN60D3482F	5-92	A6R92	18B	RC07GF332K	5-192
A6R33	13H	RN60D2872F	5-67	A6R93	13D	RC32GF181K	5-17
A6R33	13H	RN60D3162F	5-67	A6R94	14G	RN60D1102F	5-151
A6R34	8E	RC07GF102K	5-113	A6R95	14H	RN60D2152F	5-152
A6R35	8G	RC07GF183K	5-159	A6R96	10G	RC07GF223K	5-157
A6R36	11B	RN60D2613F	5-46	A6R97	11D	763H7	5-14
A6R37	11B	RN60D5622F	5-47	A6R98	19G	RC07GF472K	5-85
A6R38	7B	RC07GF183K	5-50	A6T1	17D	01-611	5-23
A6R39	7D	763F93	5-11	A6T2	7B	01-612	5-51
A6R40	22H	RC07GF472K	5-141	A6T3	25B	01-613	5-36
A6R41	25K	RC07GF153K	5-77	A6XQ1 THRU A6XQ26		05-3307-51	5-250
A6R42	26H	RC07GF183K	5-137	A7		554-1626-020	2-
A6R43	8F	RC07GF103K	5-114	A7		554-1626-023	2-
A6R44	6E	RC07GF273K	5-110	A7C1	5E	109D127X0015F2	2-8
A6R45	12G	RC07GF123K	5-155	A7C2	13D	109D476X0050F2	2-18
A6R46	8G	RC07GF332K	5-161	A7C3	21H	K100J205	2-76
A6R47	14F	RC07GF473K	5-121	A7C4	1B	150D106X0035R2	2-1
A6R48	10G	RC07GF823K	5-156	A7C5	2B	150D155X0020A2	2-151
A6R49	18G	RC07GF102K	5-143	A7C6	3B	150D106X0035R2	2-46
A6R50	18G	RC07GF104K	5-145	A7C7	9B	150D476X0020R2	2-39
A6R52	2H	RC07GF333K	5-165	A7C8	23D	109D826X0050T2	2-24
A6R54	10G	RC07GF102K	5-158	A7C9	23F	109D106X0050C2	2-83
A6R55	10B	RC07GF104K	5-176	A7C10	23B	CL37BL020MN3	2-31
A6R55	10B	RC07GF223K	5-176	A7C11	21B	CL37BL020MN3	2-32
A6R56	10C	RC07GF103K	5-215	A7C12	11H	109D127X0015F2	2-67
A6R56	10C	RC07GF223K	5-215	A7C13	4E	CM05F101J03	2-105
A6R57	9F	RC07GF103K	5-98	A7C14	2E	CM07F103J03	2-48
A6R58	6C	RC07GF272K	5-218	A7C15	4H	CM05F101J03	2-149
A6R59	6E	RN60D6191F	5-108	A7C16	8E	913-3010-00	2-107
A6R60	6D	RN60D2151F	5-220	A7C17	12D	K2R2J355	2-162
A6R61	7E	RN60D2151F	5-10	A7C17	12D	STA552-1	2-162
A6R62	6D	RN60D6191F	5-219	A7C18	15D	K22J155	2-162A
A6R63	4D	RC07GF104K	5-221	A7CR2	12F	1N458	2-112
A6R64	24E	RC07GF223K	5-129	A7CR3	13H	1N458	2-70
A6R65	26F	RC07GF222K	5-133	A7CR4	13G	1N458	2-90
A6R66	21G	RC07GF153K	5-82	A7CR5	18E	1N746A	2-118
A6R67	18G	RC07GF154K	5-123	A7CR6	7F	1N458	2-97
A6R68	19F	RC07GF393K	5-86	A7CR7	6D	1N458	2-171
A6R69	24H	RC07GF393K	5-138	A7CR8	13E	1N458	2-16
A6R70	26D	RC07GF153K	5-205	A7CR9	10B	1N458	2-159
A6R71	26F	RC07GF222K	5-134	A7CR10	10B	1N756A	2-156B
A6R72	24F	RC07GF222K	5-128	A7CR11	8C	1N746A	2-168
A6R73	18F	RC07GF473K	5-124	A7CR12	9D	1N458	2-12
A6R74	16G	RC07GF183K	5-122	A7CR13	22H	1N198	2-129
A6R75	16H	RC07GF472K	5-146	A7CR14	17H	1N458	2-75
A6R76	22H	RC07GF100K	5-140	A7CR15	24H	1N458	2-128
A6R77	16H	RC07GF222K	5-147	A7CR16	17K	1N746A	2-73
A6R78	21K	RC07GF472K	5-74	A7CR17	18F	1N458	2-116
A6R79	1C	RC07GF563K	5-3	A7CR18	24G	1N458	2-125
A6R80	1D	RC07GF563K	5-4	A7CR19	18F	1N458	2-121
A6R81	2F	RC07GF104K	5-104	A7CR20	24F	1N458	2-123
A6R82	1G	RC07GF153K	5-56	A7CR21	26F	1N458	2-124
A6R83	4F	RC07GF562K	5-107	A7CR23	12G	1N458	2-140
A6R84	6H	RC07GF822K	5-162	A7CR24	15K	1N458	2-69
A6R85	4H	RC07GF103K	5-164	A7CR27	17G	1N2989B	2-87
A6R86	5K	RC07GF103K	5-61	A7CR28	7E	1N746A	2-9
A6R87	1K	RC07GF122K	5-58	A7CR29	19F	1N2610	2-86
A6R88	26E	RC07GF473K	5-131	A7CR30	20E	1N746A	2-120
A6R89	16A	RC07GF100K	5-186	A7CR31	20F	1N458	2-122



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SYMBOL	LOCATION	PART NUMBER	FIG. -ITEM	SYMBOL	LOCATION	PART NUMBER	FIG. -ITEM
A7CR32	20G	1N458	2-131	A7R15	6D	RC07GF562K	2-170
A7CR33	25K	1N458	2-80	A7R16	11C	RC07GF333K	2-38
A7CR34	18H	1N458	2-133	A7R17	10B	RC07GF222K	2-158
A7CR35	10H	1N458	2-143	A7R18	12A	RC07GF153K	2-160
A7CR36	7H	1N756A	2-64	A7R19	7F	RC07GF473K	2-98
A7CR37	8H	1N458	2-145	A7R20	10F	RC07GF104K	2-109
A7CR38	5G	1N458	2-101	A7R21	4D	RC07GF102K	2-172
A7CR39	3H	1N458	2-49	A7R22	2D	RC07GF223K	2-173
A7CR40	9B	1N458	2-41	A7R23	9E	RC07GF102K	2-13
A7J1	2K	SKT41BRN	2-175	A7R24	8C	RC07GF563K	2-167
A7J2	2H	SKT41RED	2-176	A7R24	10C	RC07GF104K	2-167A
A7J3	2G	SKT41ORN	2-177	A7R24	10C	RC07GF124K	2-167A
A7J4	2G	SKT41YEL	2-178	A7R24	10C	RC07GF154K	2-167A
A7J5	2F	SKT41GRN	2-179	A7R24	10C	RC07GF184K	2-167A
A7J6	2E	SKT41BLU	2-180	A7R24	10C	RC07GF224K	2-167A
A7J7	2D	SKT41VIO	2-181	A7R24	10C	RC07GF274K	2-167A
A7J8	2D	SKT41GY	2-182	A7R24	10C	RC07GF334K	2-167A
A7J9	2C	SKT41WHT	2-183	A7R24	10C	RC07GF394K	2-167A
A7J10	2B	SKT41BLK	2-184	A7R24	10C	RC07GF563K	2-167A
A7J11	2A	SKT41BRN	2-185	A7R24	10C	RC07GF683K	2-167A
A7L1	3D	EL047	2-4	A7R24	10C	RC07GF823K	2-167A
A7P1	27E	DC37PC7	2-26	A7R25	10D	RC07GF100K	2-157
A7Q1	11G	2N697	2-95	A7R26	14F	RC07GF471K	2-113
A7Q2	11E	2N404A	2-14	A7R27	14F	RC07GF102K	2-114
A7Q3	15E	2N1711	2-21	A7R28	14F	RC07GF682K	2-115
A7Q4	13F	2N404A	2-92	A7R29	14H	RC07GF682K	2-139
A7Q5	11C	2N697	2-36	A7R30	19G	RC07GF123K	2-85
A7Q6	11B	2N697	2-37	A7R31	22G	RC07GF102K	2-130
A7Q7	9F	2N337	2-94	A7R32	23K	RC07GF473K	2-78
A7Q8	17F	2N1711	2-88	A7R33	19K	RC07GF122K	2-74
A7Q9	9E	2N2386	2-10	A7R34	18H	RC07GF102K	2-134
A7Q10	9K	2N697	2-65	A7R35	16G	RC07GF392K	2-135
A7Q11	21K	2N404A	2-77	A7R36	16G	RC07GF333K	2-136
A7Q12	15H	2N404A	2-72	A7R38	12G	RC07GF472K	2-142
A7Q13	7B	2N337	2-42	A7R39	12H	RC07GF183K	2-141
A7Q14	7C	2N337	2-43	A7R40	14H	RC07GF822K	2-137
A7Q15	5D	2N657A	2-7	A7R41	14H	RC07GF183K	2-138
A7Q16	19B	2N657A	2-33	A7R42	13K	RC07GF682K	2-68
A7Q17	19C	2N657A	2-34	A7R43	27K	RC07GF562K	2-81
A7Q18	19D	2N1488	2-22	A7R44	1E	RC07GF562K	2-6
A7Q19	17K	2N404A	2-71	A7R45	2C	RC07GF471K	2-150
A7Q20	25H	2N697	2-82	A7R46	1D	RC07GF122K	2-5
A7Q21	5K	2N697	2-57	A7R47	2A	RC07GF102K	2-152
A7Q22	5F	2N697	2-100	A7R48	4A	RC07GF392K	2-153
A7Q23	9H	2N404A	2-66	A7R49	3D	RC07GF820K	2-45
A7Q24	7H	2N706	2-60	A7R50	5B	RN60D5621F	2-44
A7Q25	1K	2N706	2-51	A7R51	25B	RW69V561	2-30
A7R1	11F	RC07GF153K	2-93	A7R52	25B	RW69V221	2-29
A7R2	12E	RC07GF472K	2-111	A7R53	5C	RN60D3161F	2-2
A7R3	13G	RC07GF822K	2-91	A7R54	4B	RN60D5622F	2-154
A7R4	7G	RN60D7501F	2-96	A7R55	6B	RN60D3161F	2-155
A7R5	10E	RC07GF152K	2-110	A7R56	7D	RC07GF222K	2-11
A7R6	13E	RC07GF472K	2-15	A7R57	25D	RW69V470	2-25
A7R7	12D	RC07GF562K	2-164	A7R58	18A	RC07GF271K	2-161
A7R8	12D	RC07GF472K	2-165	A7R59	27B	RW69V3R9	2-28
A7R9	15D	RC07GF182K	2-20	A7R60	8E	RC07GF222K	2-108
A7R10	18E	RC07GF103K	2-119	A7R61	21F	RW67V471	2-84
A7R11	15E	RC07GF562K	2-17	A7R62	18E	RC07GF183K	2-117
A7R12	15D	RC07GF103K	2-19	A7R63	15G	RC07GF472K	2-89
A7R13	14D	RC07GF562K	2-163	A7R64	20G	RC07GF332K	2-132
A7R14	6D	RC07GF333K	2-169	A7R65	25K	RC07GF103K	2-79



ILLUSTRATED PARTS CATALOG

SYMBOL	LOCATION	PART NUMBER	FIG. -ITEM
A7R66	26H	RC07GF332K	2-127
A7R67	26H	RC07GF562K	2-126
A7R68	3K	RC07GF102K	2-56
A7R69	8H	RC07GF103K	2-146
A7R70	7H	RC07GF104K	2-63
A7R71	9K	RC07GF472K	2-62
A7R72	10G	RN60D5111F	2-144
A7R73	8G	RC07GF103K	2-147
A7R74	5G	RC07GF473K	2-99
A7R75	2E	RC07GF473K	2-106
A7R76	6F	RC07GF103K	2-104
A7R77	6G	RC07GF683K	2-103
A7R78	3H	RC07GF103K	2-58
A7R79	2G	224L1-202	2-102
A7R80	1K	TITM1-4 500-5PCT	2-50
A7R81	1K	MFS1-8 6-2K1PCTT7	2-53
A7R82	3K	RC07GF272K	2-54
A7R83	3K	RC07GF102K	2-55
A7R84	6K	RC07GF473K	2-148
A7R85	5H	RC07GF103K	2-59
A7R86	10C	RC07GF102K	2-166
A7R87	8B	RC07GF222K	2-156A
A7R87	8B	RC20GF102K	2-156
A7R87	8B	RC20GF122K	2-156
A7R87	8B	RC20GF152K	2-156
A7R87	8B	RC20GF182K	2-156
A7R87	8B	RC20GF221K	2-156
A7R87	8B	RC20GF222K	2-156
A7R87	8B	RC20GF271K	2-156
A7R87	8B	RC20GF331K	2-156
A7R87	8B	RC20GF391K	2-156
A7R87	8B	RC20GF471K	2-156
A7R87	8B	RC20GF561K	2-156
A7R87	8B	RC20GF681K	2-156
A7R87	8B	RC20GF821K	2-156
A7R88	9B	RC07GF471K	2-40

SYMBOL	LOCATION	PART NUMBER	FIG. -ITEM
A7R89	9D	RC07GF474K	2-167B
A7T1	15A	32081	2-35
A7XQ1 THRU A7XQ17		05-3307-51	2-196
A7XQ19 THRU A7XQ23		05-3307-51	2-196
DISTANCE MECHANISM FOR USAGE CODES A, B, C, D, E, F			
A8B1		AY523-46A1	3-124
A8B2		CR40911023	3-149
A8B2		TGC11F4A067	3-149
A8B3		CR40911023	3-150
A8B3		TGC11F4A067	3-150
A8E4		RTMT12M	3-17
A8MG1		6229-41-01	3-154
A8P1		DD50PC7	3-13
A8P1		741-6268	3-127
A8S1		38AS1	3-38
A8S2		38AS2	3-44
DISTANCE MECHANISM FOR USAGE CODES L, M			
A8B1		CSH10RCLS6A948	23-140
A8B2		CG10LCJS03A915	23-139
A8B3		CG10LCJS03A915	23-122
A8B4		CG10LCJS03A915	23-106
A8MG1		AFRH10KF328	23-126
A8MG1		ST10087	23-126
A8P1		DD50PC7	23-19
A8R1		PS11CZ	23-114
A8R2		RN65D2150F	23-118
A8R3		761-3531-001	23-135
A8S1		CS402-2-54	23-110
A8S1		CS402-3-54	23-110



ILLUSTRATED PARTS CATALOG

SECTION III PARTS LIST INDEXES

COMMERCIAL HARDWARE LIST

PART NUMBER	NOMENCLATURE
200-1010-00	GROMMET, RUB., 1/8 ID, 5/16 OD, 7/32 THK
200-1030-00	GROMMET, RUB., 3/16 ID, 13/16 OD, 7/32 THK
201-0001-00	GROMMET, RUB., 3/16 ID, 7/16 OD, 3/16 THK
201-1040-00	GROMMET, RUB., 1/8 ID, 1/32 OD, 3/16 THK
201-1060-00	GROMMET, RUB., 9/32 ID, 9/16 OD, 1/4 THK
201-1080-00	GROMMET, RUB., 13/32 ID, 11/16 OD, 1/4 THK
302-0024-00	WASHER, NONMETALLIC, CORPRENE, 0.125 ID, 0.312 OD, 0.032 THK
302-0638-020	WASHER, NONMETALLIC, RUB., 0.195 ID, 0.375 OD, 0.020 THK
305-0146-00	RIVET, TUBULAR, CAD. PL STL, FH, 0.089 DIA X 3/32 LG SHK
305-0147-00	RIVET, TUBULAR, CAD. PL STL, FH, 0.089 DIA X 7/32 LG SHK
305-1352-00	RIVET, SOLID, AL, FH, 0.062 DIA X 0.187 LG SHK
305-1361-00	RIVET, SOLID, AL, FH, 3/32 DIA X 3/16 LG SHK
305-1710-00	RIVET, TUBULAR, BRS, OVAL HD, 0.061 DIA X 0.094 LG SHK
305-1731-00	RIVET, TUBULAR, STL, OVAL HD, 0.089 DIA X 0.125 LG SHK
305-1788-00	RIVET, TUBULAR, BRS, OVAL HD, 0.123 DIA X 0.156 LG SHK
307-1218-00	EYELET, METALLIC, BRS, 0.170 DIA X 0.105 LG BARREL
310-0033-00	WASHER, LOCK, CAD. PL STL, 0.166 ID, 0.406 OD, 0.139 THK
310-0044-00	WASHER, FLAT, SST, 0.093 ID, 0.250 OD, 0.027 THK
310-0045-00	WASHER, FLAT, SST, 0.125 ID, 0.312 OD, 0.027 THK
310-0046-00	WASHER, FLAT, SST, 0.147 ID, 0.312 OD, 0.032 THK
310-0054-00	WASHER, FLAT, NI PL BRS, 0.125 ID, 0.312 OD, 0.028 THK
310-0055-00	WASHER, FLAT, NI PL BRS, 0.147 ID, 0.312 OD, 0.032 THK
310-0059-00	WASHER, FLAT, NI PL BRS, 0.203 ID, 0.437 OD, 0.038 THK
310-0070-00	WASHER, LOCK, SST, SR, 0.088 ID, 0.165 OD, 0.015 THK
310-0071-00	WASHER, LOCK, SST, SR, 0.141 ID, 0.239 OD, 0.025 THK
310-0072-00	WASHER, LOCK, SST, SR, 0.168 ID, 0.296 OD, 0.040 THK
310-0074-00	WASHER, LOCK, BRZ, SR, 0.088 ID, 0.175 OD, 0.020 THK
310-0076-00	WASHER, LOCK, BRZ, SR, 0.115 ID, 0.212 OD, 0.025 THK
310-0077-00	WASHER, LOCK, BRZ, SR, 0.141 ID, 0.253 OD, 0.031 THK
310-0078-00	WASHER, LOCK, BRZ, SR, 0.141 ID, 0.239 OD, 0.025 THK
310-0081-00	WASHER, LOCK, BRZ, SR, 0.194 ID, 0.323 OD, 0.040 THK
310-0275-00	WASHER, LOCK, SST, SR, 0.088 ID, 0.175 OD, 0.020 THK
310-0276-00	WASHER, LOCK, SST, SR, 0.102 ID, 0.188 OD, 0.020 THK
310-0278-00	WASHER, LOCK, SST, SR, 0.115 ID, 0.202 OD, 0.020 THK
310-0279-00	WASHER, LOCK, SST, SR, 0.115 ID, 0.212 OD, 0.025 THK
310-0282-00	WASHER, LOCK, SST, SR, 0.141 ID, 0.253 OD, 0.031 THK
310-0501-00	WASHER, LOCK, SST, SR, 0.073 ID, 0.117 OD, 0.022 THK
310-0284-00	WASHER, LOCK, SST, SR, 0.194 ID, 0.337 OD, 0.047 THK
310-6320-00	WASHER, FLAT, SST, 0.092 ID, 0.219 OD, 0.018 THK
310-6360-00	WASHER, FLAT, SST, 0.147 ID, 0.375 OD, 0.031 THK
311-0416-00	PIN, SPG, SST, 0.062 DIA X 3/16 LG
311-0417-00	PIN, SPG, SST, 0.062 DIA X 1/4 LG
311-0418-00	PIN, SPG, SST, 0.062 DIA X 5/16 LG
311-0419-00	PIN, SPG, SST, 0.062 DIA X 3/8 LG
311-0420-00	PIN, SPG, SST, 0.062 DIA X 7/16 LG
311-0438-00	PIN, SPG, SST, 0.047 DIA X 0.187 LG
311-5013-00	PIN, TAPERED, PLAIN, SST, 0.094 DIA X 1/2 LG
312-0063-00	STUD, CONTINUOUS THD, CAD. PL BRS, 4-40UNC-2A X 7/16 LG
313-0037-00	NUT, PLAIN, HEX., SST, 2-56UNC-2B THD
313-0050-00	NUT, PLAIN, HEX., NI PL BRS, 2-56UNC-2B THD
313-0051-00	NUT, PLAIN, HEX., NI PL BRS, 4-40UNC-2B THD
313-0056-00	NUT, PLAIN, KEX., NI PL BRS, 10-32UNF-2B THD
313-0132-00	NUT, PLAIN, HEX., SST, 4-40UNC-2B THD
313-0140-00	NUT, PLAIN, HEX., NI PL BRS, 6-32UNC-2B THD
313-0156-00	NUT, PLAIN, HEX., NI PL BRS, 4-40UNC-2B THD
322-0175-00	SCREW, MACH., SST, SLOT, FH, 1-64UNC-2A X 3/16 LG
323-0254-00	SCREW, MACH., SST, SLOT, BIND, HD, 0-80UNF-2A X 1/8 LG
328-0006-00	SETSCREW, CAD. PL STL, 6-32NC-3A X 1/8 LG
328-0368-00	SETSCREW, CAD. PL STL, 2-56NC-3A X 3/32 LG
330-1021-00	SCREW, MACH., SST, PAN HD, 4-40UNC-2A X 1/2 LG
330-2084-00	SCREW, MACH., NYLON, SLOT, FH, 2-56UNC-2A X 1/2 LG
330-2099-00	SCREW, MACH., NYLON, SLOT, FH, 4-40UNC-2A X 3/16 LG
330-2284-00	SCREW, MACH., SST, FH, 2-56UNC-2A X 3/16 LG

SECTION III
PARTS LIST INDEXES



ILLUSTRATED PARTS
CATALOG

PART NUMBER	NOMENCLATURE	QTY.
330-2290-00	SCREW, MACH., SST, FH, 4-40UNC-2A X 1/4 LG	
330-3599-00	SCREW, MACH., SST, FH, 4-40NC-2A X 5/16 LG	
330-3600-00	SCREW, MACH., SST, FH, 4-40NC-2A X 3/8 LG	
334-0249-00	NUT, PLAIN, HEX, SST, 5/16-24 UNF-2B THD	
334-0284-00	NUT, PLAIN, HEX., SST, 7/16-28UNEF-2B THD	
334-1561-00	NUT, PLAIN, CLINCH, SST, 4-40 UNC THD	
334-4050-00	NUT, PLAIN, HEX., CAD. PL BRS, 5/16-24UNF-2B THD	
334-4060-00	NUT, PLAIN, HEX., NI PL BRS, 3/8-32UNEF-2B THD	
335-0003-00	SETSCREW, CAD. PL STL, 6-32NC-3A X 1/8 LG	
335-0010-00	SETSCREW, CAD. PL STL, 8-32NC-3A X 1/8 LG	
335-0037-00	SETSCREW, CAD. PL STL, 4-48UNF-3A X 1/8 LG	
335-0122-00	SETSCREW, CAD. PL STL, 2-56UNC-3A X 1/8 LG	
335-0125-00	SETSCREW, CAD. PL STL, 4-40UNC-3A X 1/8 LG	
342-0022-00	SCREW, MACH., SST, FH, 6-32NC-2A X 1/4 LG	
342-0024-00	SCREW, MACH., SST, FH, 6-32NC-2A X 3/8 LG	
342-0042-00	SCREW, MACH., SST, FH, 4-40UNC-2A X 1/8 LG	
342-0043-00	SCREW, MACH., SST, FH, 4-40UNC-2A X 3/16 LG	
342-0044-00	SCREW, MACH., SST, FH, 4-40UNC-2A X 1/4 LG	
342-0045-00	SCREW, MACH., SST, FH, 4-40UNC-2A X 5/16 LG	
342-0046-00	SCREW, MACH., SST, FH, 4-40UNC-2A X 3/8 LG	
342-0059-00	SCREW, MACH., SST, FH, 6-32UNC-2A X 3/16 LG	
342-0060-00	SCREW, MACH., SST, FH, 6-32UNC-2A X 1/4 LG	
342-0061-00	SCREW, MACH., SST, FH, 6-32UNC-2A X 5/16 LG	
342-0064-00	SCREW, MACH., SST, FH, 6-32UNC-2A X 1/2 LG	
342-0072-00	SCREW, MACH., SST, FH, 6-32UNC-2A X 1-1/2 LG	
342-0078-00	SCREW, MACH., SST, FH, 8-32UNC-2A X 3/8 LG	
342-0123-00	SCREW, MACH., SST, FH, 12-24UNC-2A X 1-1/4 LG	
342-0131-00	SCREW, MACH., SST, FH, 2-56UNC-2A X 1/8 LG	
342-0132-00	SCREW, MACH., SST, FH, 2-56UNC-2A X 3/16 LG	
342-0133-00	SCREW, MACH., SST, FH, 2-56UNC-2A X 1/4 LG	
342-0134-00	SCREW, MACH., SST, FH, 2-56UNC-2A X 5/16 LG	
342-0135-00	SCREW, MACH., SST, FH, 2-56UNC-2A X 3/8 LG	
342-0136-00	SCREW, MACH., SST, FH, 2-56UNC-2A X 7/16 LG	
342-0143-00	SCREW, MACH., NI PL BRS, FH, 2-56UNC-2A X 1/4 LG	
342-0151-00	SCREW, MACH., NI PL BRS, FH, 4-40UNC-2A X 3/16 LG	
342-0273-00	SCREW, MACH., CAD. PL STL, FH, 4-40NC-2A X 5/32 LG	
343-0005-00	SCREW, MACH., SST, PAN HD, 2-56UNC-2A X 5/8 LG	
343-0122-00	SCREW, MACH., SST, PAN HD, 2-56UNC-2A X 1/8 LG	
343-0123-00	SCREW, MACH., SST, PAN HD, 2-56UNC-2A X 3/16 LG	
343-0124-00	SCREW, MACH., SST, PAN HD, 2-56UNC-2A X 1/4 LG	
343-0125-00	SCREW, MACH., SST, PAN HD, 2-56UNC-2A X 5/16 LG	
343-0126-00	SCREW, MACH., SST, PAN HD, 2-56UNC-2A X 3/8 LG	
343-0127-00	SCREW, MACH., SST, PAN HD, 2-56UNC-2A X 7/16 LG	
343-0130-00	SCREW, MACH., SST, PAN HD, 2-56UNC-2A X 7/8 LG	
343-0131-00	SCREW, MACH., SST, PAN HD, 4-40UNC-2A X 1/8 LG	
343-0132-00	SCREW, MACH., SST, PAN HD, 4-40UNC-2A X 3/16 LG	
343-0133-00	SCREW, MACH., SST, PAN HD, 4-40UNC-2A X 1/4 LG	
343-0134-00	SCREW, MACH., SST, PAN HD, 4-40UNC-2A X 5/16 LG	
343-0135-00	SCREW, MACH., SST, PAN HD, 4-40UNC-2A X 3/8 LG	
343-0136-00	SCREW, MACH., SST, PAN HD, 4-40UNC-2A X 7/16 LG	
343-0137-00	SCREW, MACH., SST, PAN HD, 4-40UNC-2A X 1/2 LG	
343-0138-00	SCREW, MACH., SST, PAN HD, 4-40UNC-2A X 5/8 LG	
343-0167-00	SCREW, MACH., SST, PAN HD, 6-32UNC-2A X 1/4 LG	
343-0171-00	SCREW, MACH., SST, PAN HD, 6-32UNC-2A X 1/2 LG	
343-0172-00	SCREW, MACH., SST, PAN HD, 6-32UNC-2A X 9/16 LG	
343-0173-00	SCREW, MACH., SST, PAN HD, 6-32UNC-2A X 5/8 LG	
343-0174-00	SCREW, MACH., SST, PAN HD, 6-32UNC-2A X 3/4 LG	
343-0175-00	SCREW, MACH., SST, PAN HD, 6-32UNC-2A X 7/8 LG	
343-0176-00	SCREW, MACH., SST, PAN HD, 6-32UNC-2A X 1 LG	
343-0180-00	SCREW, MACH., SST, PAN HD, 6-32UNC-2A X 1-1/2 LG	
343-0191-00	SCREW, MACH., SST, PAN HD, 8-32UNC-2A X 3/4 LG	
343-0192-00	SCREW, MACH., SST, PAN HD, 8-32UNC-2A X 7/8 LG	
343-0284-00	SCREW, MACH., NI PL BRS, PAN HD, 4-40UNC-2A X 3/16 LG	



ILLUSTRATED PARTS CATALOG

SECTION III
PARTS LIST INDEXES

PART NUMBER	NOMENCLATURE	QTY.
343-0288-00	SCREW, MACH., NI PL BRS, PAN HD, 4-40UNC-2A X 7/16 LG	
343-0290-00	SCREW, MACH., NI PL BRS, PAN HD, 4-40UNC-2A X 5/8 LG	
343-0297-00	SCREW, MACH., NI PL BRS, PAN HD, 2-56UNC-2A X 1/8 LG	
343-0298-00	SCREW, MACH., NI PL BRS, PAN HD, 2-56UNC-2A X 3/16 LG	
343-0299-00	SCREW, MACH., NI PL BRS, PAN HD, 2-56UNC-2A X 1/4 LG	
343-0300-00	SCREW, MACH., NI PL BRS, PAN HD, 2-56UNC-2A X 5/16 LG	
343-0301-00	SCREW, MACH., NI PL BRS, PAN HD, 2-56UNC-2A X 3/8 LG	
343-0304-00	SCREW, MACH., NI PL BRS, PAN HD, 2-56UNC-2A X 3/4 LG	
343-0331-00	SCREW, MACH., NI PL BRS, PAN HD, 6-32UNC-2A X 7/16 LG	
343-0332-00	SCREW, MACH., NI PL BRS, PAN HD, 6-32UNC-2A X 1/2 LG	
343-0510-00	SCREW, MACH., CAD. PL STL, PAN HD, 6-32UNC-2A X 1-5/8 LG	
347-0006-00	SCREW, MACH., SST, FIL H, 4-40UNC-2A X 1/4 LG	
347-0010-00	SCREW, MACH., SST, FIL H, 4-40UNC-2A X 1/2 LG	
347-0009-00	SCREW, MACH., SST, FIL H, 4-40UNC-2A X 7/16 LG	
347-0038-00	SCREW, MACH., SST, FIL H, 6-32UNC-2A X 5/8 LG	
347-0091-00	SCREW, MACH., NI PL BRS, FIL H, 4-40UNC-2A 5/16 LG	
373-0031-00	WASHER, LOCK, NI PL BRS, INT TEETH, 0.391 ID, 0.507 OD, 0.022 THK	
373-0045-00	WASHER, LOCK, SST, INT TEETH, 0.332 ID, 0.607 OD, 0.030 THK	
373-0155-00	WASHER, LOCK, SST, INT TEETH, 0.150 ID, 0.333 OD, 0.025 THK	
373-0157-00	WASHER, LOCK, SST, INT TEETH, 0.176 ID, 0.383 OD, 0.029 THK	
373-3060-00	WASHER, LOCK, BRZ, INT TEETH 0.332 ID, 0.607 OD, 0.030 THK	

SECTION IV

860E-2 DISTANCE
MEASURING EQUIPMENTILLUSTRATED PARTS
CATALOG

Section IV

Group Assembly Parts List

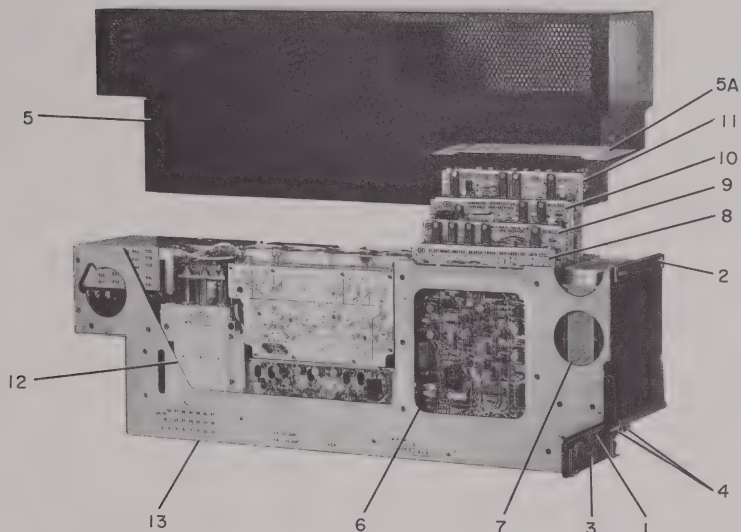
860E-2 Distance Measuring Equipment
Figure 1

FIG. -ITEM	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
1 -	522-2702-011	860E-2	DISTANCE	MEASURING	EQUIPMENT				A	1
1 -	522-2702-014	860E-2	DISTANCE	MEASURING	EQUIPMENT				R	1
1 -	522-2702-052	860E-2	DISTANCE	MEASURING	EQUIPMENT				C	1
1 -	522-2702-053	860E-2	DISTANCE	MEASURING	EQUIPMENT				D	1
1 -	522-2702-054	860E-2	DISTANCE	MEASURING	EQUIPMENT				F	1
1 -	522-2702-056	860E-2	DISTANCE	MEASURING	EQUIPMENT				F	1
1 -	522-2702-058	860E-2	DISTANCE	MEASURING	EQUIPMENT				L	1
1 -	522-2702-060	860E-2	DISTANCE	MEASURING	EQUIPMENT				M	1
1 -	522-2702-055	860E-2	DISTANCE	MEASURING	EQUIPMENT				N	1
- 1	554-1980-003	• PLATE, IDENT								1
	MS35216-2	• ATTACHING PARTS								
		• SCREW V77250 343-0123-00								2
		- - * - -								
- 2	554-2056-003	• STRIP, IDENT								1
- 3	7	• CAP-PLUG, PROTECTIVE V99017 150-0427-00								1
- 4	3X	• CAP-PLUG, PROTECTIVE V99017 150-0428-00								2
- 5	554-2103-004	• COVER, RCVR-XMTR								1
- 5A	756-7402-001	• PLATE, LKG EFF MCN 1377 SR-27								1
- 6	554-1626-00	• ELECTRONIC CONTROL AMPLIFIER A7 SFE							A	1
		FIG. 2								
- 6	554-1626-011	• ELECTRONIC CONTROL AMPLIFIER A7 SFE							B,E	1
		FIG. 2							F	
- 6	554-1626-021	• ELECTRONIC CONTROL AMPLIFIER A7 SFE							C	1
		FIG. 2								



ILLUSTRATED PARTS CATALOG

SECTION IV ELECTRONIC CONTROL AMPLIFIER

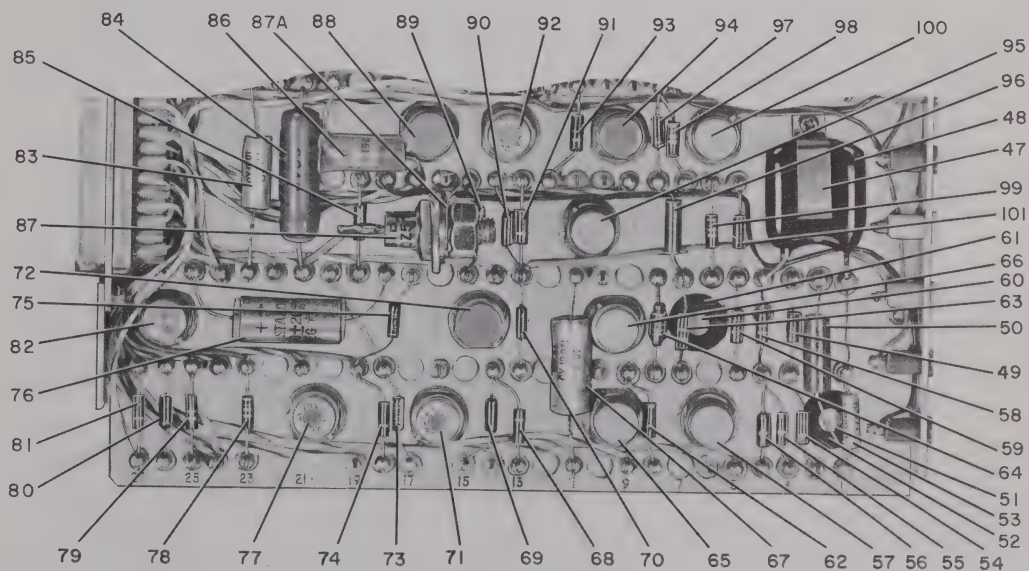
FIG. & INDEX NO.	PART NO.	NOMENCLATURE										USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7					
1	- 6	554-1626-022	•	ELECTRONIC CONTROL AMPLIFIER	A7	SFE						D	1
				FIG. 2									
R	- 6	554-1626-020	•	ELECTRONIC CONTROL AMPLIFIER	SEE FIG. 2							L,M	1
				EFF THRU MCN 2743								N	
R	- 6	554-1626-020	•	ELECTRONIC CONTROL AMPLIFIER	SEE FIG. 2							L,M	1
				EFF MCN 2744									
R	- 6	554-1626-023	•	ELECTRONIC CONTROL AMPLIFIER	SEE FIG. 2							N	1
				EFF MCN 2744									
	- 7	528-0455-004	•	DISTANCE MECHANISM	A8	SEE FIG. 3						A,B	1
												C,D	
												E,F	
	- 7	528-0470-005	•	DISTANCE MECHANISM	A8	SEE FIG. 23						L,N	1
	- 7	528-0470-006	•	DISTANCE MECHANISM	A8	SEE FIG. 23						M	1
	- 8	554-1625-00	•	SEARCH TRACK ELECTRONIC SWITCH	A6	SFF							1
				FIG. 5									
	- 9	554-1624-00	•	DISTANCE PULSE DECODER	A3	SEE FIG. 6							1
	- 10	554-1623-00	•	DISTANCE INTERROGATION GENERATOR	A5	SFE							1
				FIG. 7									
	- 11	554-1622-00	•	DISTANCE TIME BASE GENERATOR	A4	SFE							1
				FIG. 8									
	- 12	554-1627-00	•	RADIO RECEIVER-TRANSMITTER	A2	SEE FIG. 9							1
	- 13	554-1621-011	•	POWER SUPPLY CHASSIS	A1	SEE FIG. 21						A,F	1
	- 13	554-1621-00	•	POWER SUPPLY CHASSIS	A1	SEE FIG. 21						B,L,M	1
	- 13	554-1621-018	•	POWER SUPPLY CHASSIS	A1	SEE FIG. 21						C,N	1
	- 13	554-1621-014	•	POWER SUPPLY CHASSIS	A1	SFF FIG. 21						D	1
	- 13	554-1621-013	•	POWER SUPPLY CHASSIS	A1	SEE FIG. 21						F	1
2	-	554-1626-00		ELECTRONIC CONTROL AMPLIFIER	A7	SEF						A	REF
				FIG. 1-6 FOR NHA									
2	-	554-1626-011		ELECTRONIC CONTROL AMPLIFIER	A7	SEE FIG.						A,E	REF
				1-6 FOR NHA								F	
2	-	554-1626-021		ELECTRONIC CONTROL AMPLIFIER	A7	SEE FIG.						C	REF
				1-6 FOR NHA									
2	-	554-1626-022		ELECTRONIC CONTROL AMPLIFIER	A7	SEE FIG.						D	REF
				1-6 FOR NHA									
R	2	-	554-1626-020	ELECTRONIC CONTROL AMPLIFIER	A7	SEE FIG.						L,M	REF
				1-6 FOR NHA									
R	2	-	554-1626-020	ELECTRONIC CONTROL AMPLIFIER	A7	SEE FIG.						N	REF
				1-6 FOR NHA EFF THRU MCN 2743									
R	2	-	554-1626-023	ELECTRONIC CONTROL AMPLIFIER	A7	SEE FIG.						N	REF
				1-6A FOR NHA EFF MCN 2744									
	- 1	150D106X0035	•	CAPACITOR, 10 UF 20%, 35 VDCW	V56289								1
		R2		184-7694-00	A7C4								
	- 2	RN60D3161F	•	RESISTOR, 3160 OHMS 1%, 1/8 W	V75042								1
				705-6620-00	A7R53								
	- 3	554-2164-003	•	CLIP, SPG TENS									1
				ATTACHING PARTS									
		MS35216-2	•	SCREW	V77250	343-0123-00							1
				- - * - -									
	- 4	EL047	•	REACTOR, 250 MH	V80223	668-0034-00	A7L1						1
	- 5	RC07GF122K	•	RESISTOR, 1200 OHMS 10%, 1/4 W	V01121								1
				745-0752-00	A7R46								
	- 6	RC07GF562K	•	RESISTOR, 5600 OHMS 10%, 1/4 W	V01121								1
				745-0776-00	A7R44								
	- 7	2N657A	•	TRANSISTOR	V96214	352-0354-00	A7Q15						1
	- 8	109D127X0015	•	CAPACITOR, 120 UF 20%, 15 VDCW	V56289								1
		F2		184-7789-00	A7C1								
	- 9	1N746A	•	SEMICONDUCTOR DEVICE, ZENER DIO, 3.3 V 5%									1
				V03508	353-2938-00	A7CR28							
	- 10	2N2386	•	TRANSISTOR	V96214	352-0427-00	A7Q9						1
	- 11	RC07GF222K	•	RESISTOR, 2200 OHMS 10%, 1/4 W	V01121								1
				745-0761-00	A7R56								
	- 12	1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00							1
				A7CR12									

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CATALOG

FIG. & INDEX NO.	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
- 13	RC07GF102K	•	RESISTOR, 1000 OHMS 10%, 1/4 W	V01121						1
			745-0749-00 A7R23							
- 14	2N404A	•	TRANSISTOR V96214	352-0378-00	A7Q2					1
- 15	RC07GF472K	•	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121						1
			745-0773-00 A7R6							
- 16	1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00					1
			A7CR8							

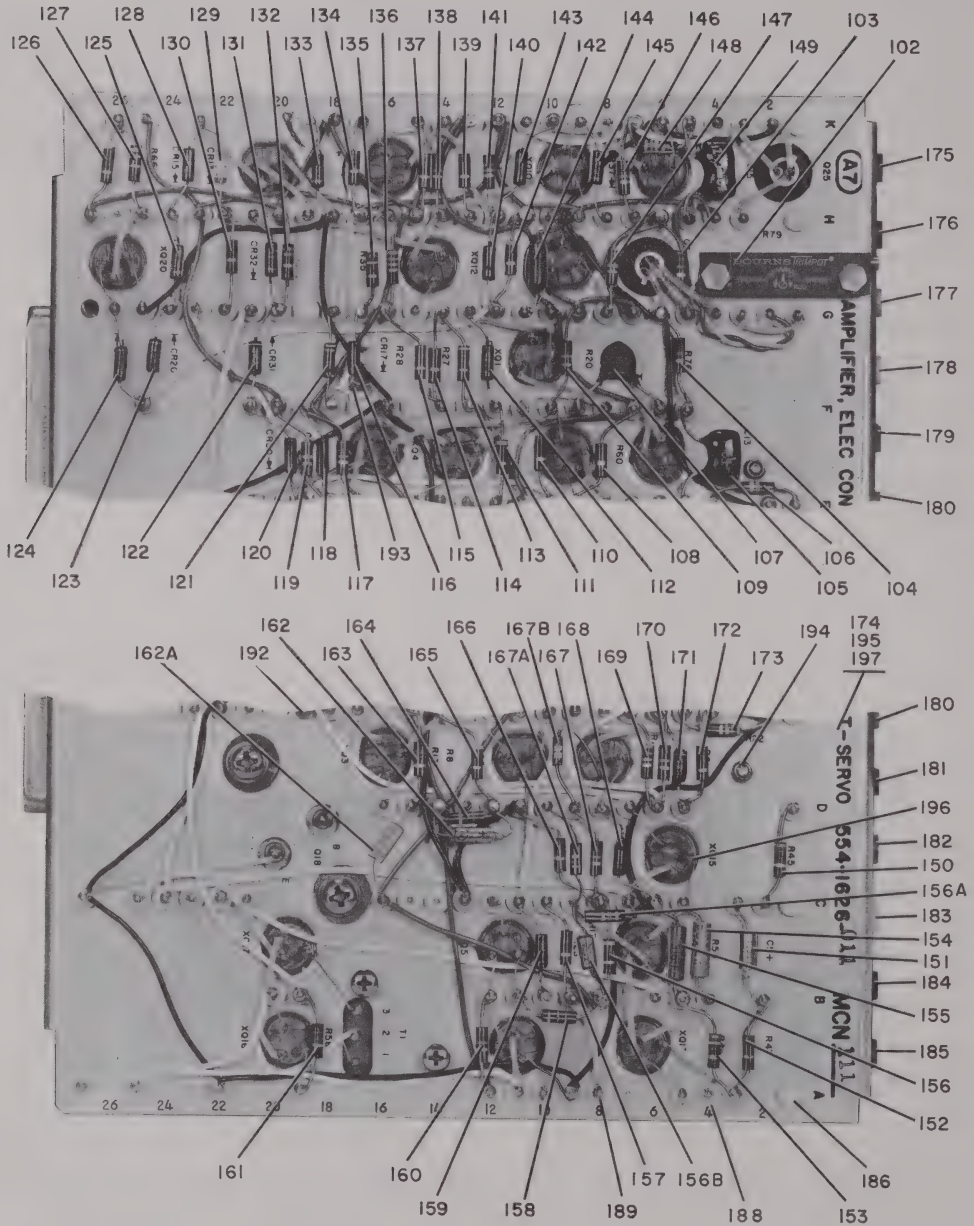


Electronic Control Amplifier (Sheet 1 of 2)
Figure 2



ILLUSTRATED PARTS CATALOG

SECTION IV ELECTRONIC CONTROL AMPLIFIER



Electronic Control Amplifier (Sheet 2 of 2)
Figure 2

SECTION IV

ELECTRONIC
CONTROL AMPLIFIERILLUSTRATED PARTS
CATALOG

FIG. -ITEM	PART NO.	NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
		1 2 3 4 5 6 7		
2	- 17	RC07GF562K . RESISTOR, 5600 OHMS 10%, 1/4 W V01121		1
		745-0776-00 A7R11		
	- 18	109D476X0050C . CAPACITOR, 47 UF 20%, 50 VDCW V56289		1
		F2 184-7788-00 A7C2		
	- 19	RC07GF103K . RESISTOR, 10,000 OHMS 10%, 1/4 W V01121		1
		745-0785-00 A7R12		
	- 20	RC20GF182K . RESISTOR, 1800 OHMS 10%, 1/2 W V01121		1
		745-1363-00 A7R9		
	- 21	2N1711 . TRANSISTOR V96214 352-0400-00 A7Q3		1
	- 22	2N1488 . TRANSISTOR V96214 352-0466-00 A7Q18		1
	- 23	2104-06-02- . TERMINAL, LUG V78189 304-0318-00		1
		2520N		
		ATTACHING PARTS FOR 22 AND 23		
	COML	. NUT 313-0140-00		2
	COML	. WASHER 310-0077-00		2
	554-2050-002	. INSULATOR, BUSH.		2
	302-2300-00	. INSULATOR, WASH.		2
	COML	. WASHER 310-0055-00		2
	COML	. SCREW 343-0331-00		2
		- - * - -		
	- 24	109D826X0050 . CAPACITOR, 82 UF 20%, 50 VDCW V56289		1
		I2 184-7778-00 A7C8		
	- 25	RW69V470 . RESISTOR, 47 OHMS 5%, 3 W V91637		1
		747-5379-00 A7R57		
	- 26	DC37PC7 . CONNECTOR, RECP V91146 371-0171-00 A7P1		1
	- 27	4040-2H0T . TERMINAL, LUG V77147 304-0014-00		1
		TINNED		
		ATTACHING PARTS FOR 26 AND 27		
	68NM26	. NUT, SELF-LKG, HEX. V72962 333-0327-00		2
		EFF THRU MCN 111		
	68-1660-26	. NUT, SELF-LKG, HEX. V72962 333-0604-00		2
		EFF MCN 112		
	COML	. SCREW 342-0143-00		2
		- - * - -		
	- 28	RW69V3R9 . RESISTOR, 3.9 OHMS 5%, 3 W V91637		1
		747-5367-00 A7R59		
	- 29	RW69V221 . RESISTOR, 220 OHMS 5%, 3 W V91637		1
		747-5347-00 A7R52		
	- 30	RW69V561 . RESISTOR, 560 OHMS 5%, 3 W V91637		1
		747-5355-00 A7R51		
	- 31	CL37BL020MN3 . CAPACITOR, 2 UF 20%, 75 VDCW V56289		1
		184-7929-00 A7C10		
	- 32	CL37BL020MN3 . CAPACITOR, 2 UF 20%, 75 VDCW V56289		1
		184-7929-00 A7C11		
	- 33	2N657A . TRANSISTOR V96214 352-0354-00 A7Q16		1
	- 34	2N657A . TRANSISTOR V96214 352-0354-00 A7Q17		1
	- 35	320B1 . TRANSFORMER, A-F V97965 667-9008-00		1
		A7T1		
		ATTACHING PARTS		
	MS35216-13	. SCREW V77250 343-0134-00		2
	MS35338-78	. WASHER V79807 310-0279-00		2
		- - * - -		
	- 36	2N697 . TRANSISTOR V96214 352-0197-00 A7Q5		1
	- 37	2N697 . TRANSISTOR V96214 352-0197-00 A7Q6		1
	- 38	RC07GF333K . RESISTOR, 33,000 OHMS 10%, 1/4 W V01121		1
		745-0803-00 A7R16		
	- 39	150D476X0020 . CAPACITOR, 47 UF 20%, 20 VDCW V56289		1
		R2 184-7664-00 A7C7		
	- 40	RC07GF471K . RESISTOR, 470 OHMS 10%, 1/4 W V01121		1
		745-0737-00 A7R88		
	- 41	1N458 . SEMICONDUCTOR DEVICE V03508 353-0205-00		1
		A7CR40		



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FIG. -ITEM	PART NO.	NOMENCLATURE										USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7					
2	- 42 2N337	•	TRANSISTOR	V96214	352-0099-00	A7013							1
	- 43 2N337	•	TRANSISTOR	V96214	352-0099-00	A7014							1
	- 44 RN60D5621F	•	RESISTOR, 5620 OHMS 1%, 1/8 W	V75042									1
				705-6632-00	A7R50								
	- 45 RC07GF820K	•	RESISTOR, 82 OHMS 10%, 1/4 W	V01121									1
				745-0710-00	A7R49								
	- 46 150D106X0035	•	CAPACITOR, 10 UF 20%, 35 VDCW	V56289									1
	R2			184-7694-00	A7C6								
	- 47 554-2150-002	•	RETAINER, CAPACITOR									B,C D,E F	1
			ATTACHING PARTS										
	MS35216-2	•	SCREW	V77250	343-0123-00								1
			- - * - -										
	- 48 CM07F103J03	•	CAPACITOR, 10,000 UUF 5%, 500 VDCW	V53021								B,C D,E F	1
				912-2735-00	A7C14								
	- 49 1N458	•	SEMICONDUCTOR DEVICE	V03508	352-0205-00							B,C D,E F	1
				A7CR39									
	- 50 TITM1-4 500-5PCT	•	RESISTOR, 500 OHMS 5%, 1/4 W	V96214								B,C D,E F	1
				714-3148-00	A7R80								
	- 51 2N706	•	TRANSISTOR	V96214	352-0195-00	A7025						B,C D,F F	1
	- 52 MS35489-4	•	GROMMET	V70485	201-0001-00							B,C D,E F	1
	- 53 MFS1-8 6-2K1 PCTT7	•	RESISTOR, 6200 OHMS 1%, 1/8 W	V19701								B,C D,E F	1
				705-5925-00	A7R81								
	- 54 RC07GF272K	•	RESISTOR, 2700 OHMS 10%, 1/4 W	V01121								B,C D,F F	1
				745-0764-00	A7R82								
	- 55 RC07GF102K	•	RESISTOR, 1000 OHMS 10%, 1/4 W	V01121								B,C D,E F	1
				745-0749-00	A7R83								
	- 56 RC07GF102K	•	RESISTOR, 1000 OHMS 10%, 1/4 W	V01121									1
				745-0749-00	A7R68								
	- 57 2N697	•	TRANSISTOR	V96214	352-0197-00	A7021						C,D	1
	- 58 RC07GF103K	•	RESISTOR, 10,000 OHMS 10%, 1/4 W	V01121								B,C D,E F	1
				745-0785-00	A7R78								
	- 59 RC07GF103K	•	RESISTOR, 10,000 OHMS 10%, 1/4 W	V01121								B,C D,E F	1
				745-0785-00	A7R85								
	- 60 2N706	•	TRANSISTOR	V96214	352-0195-00	A7024						B,C D,F F	1
	- 61 MS35489-4	•	GROMMET	V70485	201-0001-00							B,C D,E F	1
	- 62 RC07GF472K	•	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121								B,C D,E F	1
				745-0773-00	A7R71								
	- 63 RC07GF104K	•	RESISTOR, 100,000 OHMS 10%, 1/4 W	V01121								B,C D,E F	1
				745-0821-00	A7R70								
	- 64 1N756A	•	SEMICONDUCTOR DEVICE, ZENER DIO, 8.2 V 5%	V03508	353-2720-00	A7CR36						B,C D,E F	1

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ELECTRONIC
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GROUP ASSEMBLY PARTS LIST

FIG. - ITEM	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
2	- 68	RC07GF682K	•	RESISTOR, 6800 OHMS 10%, 1/4 W	V01121					1
	- 69	1N458	•	SEMICONDUCTOR DEVICE	V03508 353-0205-00					1
	- 70	1N458	•	SEMICONDUCTOR DEVICE	V03508 353-0205-00					1
	- 71	2N404A	•	TRANSISTOR	V96214 352-0378-00	A7Q19				1
	- 72	2N404A	•	TRANSISTOR	V96214 352-0378-00	A7Q12				1
	- 73	1N746A	•	SEMICONDUCTOR DEVICE, ZENER DIO, 3.3 V 5%	V03508 353-2938-00	A7CR16				1
	- 74	RC07GF122K	•	RESISTOR, 1200 OHMS 10%, 1/4 W	V01121					1
	- 75	1N458	•	SEMICONDUCTOR DEVICE	V03508 353-0205-00					1
	- 76	K100J20S	•	CAPACITOR, 100 UF 20%, 20 VDCW	V05397					1
	- 77	2N404A	•	TRANSISTOR	V96214 352-0378-00	A7Q11				1
	- 78	RC07GF473K	•	RESISTOR, 47,000 OHMS 10%, 1/4 W	V01121					1
	- 79	RC07GF103K	•	RESISTOR, 10,000 OHMS 10%, 1/4 W	V01121					1
	- 80	1N458	•	SEMICONDUCTOR DEVICE	V03508 353-0205-00					1
	- 81	RC07GF562K	•	RESISTOR, 5600 OHMS 10%, 1/4 W	V01121					1
	- 82	2N697	•	TRANSISTOR	V96214 352-0197-00	A7Q20				1
	- 83	109D106X0050 C2	•	CAPACITOR, 10 UF 20%, 50 VDCW	V56289					1
	- 84	RW67V471	•	RESISTOR, 470 OHMS 5%, 6.5 W	V91637					1
	- 85	RC07GF123K	•	RESISTOR, 12,000 OHMS 10%, 1/4 W	V01121					1
	- 86	1N2610	•	SEMICONDUCTOR DEVICE	V03508 353-1905-00					1
	- 87	1N2989B	•	SEMICONDUCTOR DEVICE, ZENER DIO, 30 V 5%	V03508 353-1369-00	A7CR27				1
R	- 87A	757-3019-001	•	TERMINAL, LUG						1
	- 88	2N1711	•	TRANSISTOR	V96214 352-0400-00	A7Q8				1
	- 89	RC07GF472K	•	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121					1
	- 90	1N458	•	SEMICONDUCTOR DEVICE	V03508 353-0205-00					1
	- 91	RC07GF822K	•	RESISTOR, 8200 OHMS 10%, 1/4 W	V01121					1
	- 92	2N404A	•	TRANSISTOR	V96214 352-0378-00	A7Q4				1
	- 93	RC07GF153K	•	RESISTOR, 15,000 OHMS 10%, 1/4 W	V01121					1
	- 94	2N337	•	TRANSISTOR	V96214 352-0099-00	A7Q7				1
	- 95	2N697	•	TRANSISTOR	V96214 352-0197-00	A7Q1				1
	- 96	RN60D7501F	•	RESISTOR, 7500 OHMS 1%, 1/8 W	V75042					1
	- 97	1N458	•	SEMICONDUCTOR DEVICE	V03508 353-0205-00					1
	- 98	RC07GF473K	•	RESISTOR, 47,000 OHMS 10%, 1/4 W	V01121					1
	- 99	RC07GF473K	•	RESISTOR, 47,000 OHMS 10%, 1/4 W	V01121					1
					745-0809-00	A7R74			B,C D,E F,L M,N	



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GROUP ASSEMBLY PARTS LIST

FIG. - ITEM	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
R 2	-100 2N697	.	TRANSISTOR	V96214	352-0197-00	A7Q22			B,C D,E F,L M,N	1
R	-101 1N458	.	SEMICONDUCTOR DEVICE	V03508	353-0205-00	A7CR38			B,C D,E F,L M,N	1
R	-102 224L1-202	.	RESISTOR, VAR,	2000 OHMS 5%, 1/2 W	V80294	381-1286-00	A7R79		B,C D,E F,L M,N	1
R	-103 RC07GF683K	.	RESISTOR, 68,000 OHMS 10%, 1/4 W	V01121	745-0815-00	A7R77			B,C D,E F,L M,N	1
	-104 RC07GF103K	.	RESISTOR, 10,000 OHMS 10%, 1/4 W	V01121	745-0785-00	A7R6			B,C D,E F	1
R	-105 CM05F101J03	.	CAPACITOR, 100 UUF 5%, 500 VDCW	V53021	912-2816-00	A7C13			B,C D,E F,L M,N	1
R	-106 RC07GF473K	.	RESISTOR, 47,000 OHMS 10%, 1/4 W	V01121	745-0809-00	A7R75			B,C D,E F,L M,N	1
R	-107 913-3010-00	.	CAPACITOR, FXD, 1500 UUF 20%, 500 VDCW	A7C16					B,C D,E F,L M,N	1
	-108 RC07GF222K	.	RESISTOR, 2200 OHMS 10%, 1/4 W	V01121	745-0761-00	A7R60				1
	-109 RC07GF104K	.	RESISTOR, 100,000 OHMS 10%, 1/4 W	V01121	745-0821-00	A7R20				1
	-110 RC07GF152K	.	RESISTOR, 1500 OHMS 10%, 1/4 W	V01121	745-0755-00	A7R5				1
	-111 RC07GF472K	.	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121	745-0773-00	A7R2				1
	-112 1N458	.	SEMICONDUCTOR DEVICE	V03508	353-0205-00	A7CR2				1
	-113 RC07GF471K	.	RESISTOR, 470 OHMS 10%, 1/4 W	V01121	745-0737-00	A7R26				1
	-114 RC07GF102K	.	RESISTOR, 1000 OHMS 10%, 1/4 W	V01121	745-0749-00	A7R28				1
	-115 RC07GF682K	.	RESISTOR, 6800 OHMS 10%, 1/4 W	V01121	745-0779-00	A7R28				1
	-116 1N458	.	SEMICONDUCTOR DEVICE	V03508	353-0205-00	A7CR17				1
	-117 RC07GF183K	.	RESISTOR, 18,000 OHMS 10%, 1/4 W	V01121	745-0794-00	A7R62				1
	-118 1N746A	.	SEMICONDUCTOR DEVICE, ZENER DIO, 3.3 V 5%	V03508	353-2938-00	A7CR5				1
	-119 RC07GF103K	.	RESISTOR, 10,000 OHMS 10%, 1/4 W	V01121	745-0785-00	A7R10				1
	-120 1N746A	.	SEMICONDUCTOR DEVICE, ZENER DIO, 3.3 V 5%	V03508	353-2938-00	A7CR30				1
	-121 1N458	.	SEMICONDUCTOR DEVICE	V03508	353-0205-00	A7CR19				1
	-122 1N458	.	SEMICONDUCTOR DEVICE	V03508	353-0205-00	A7CR31				1
	-123 1N458	.	SEMICONDUCTOR DEVICE	V03508	353-0205-00	A7CR20				1

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ELECTRONIC
CONTROL AMPLIFIERILLUSTRATED PARTS
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FIG. -ITEM	PART NO.	NOMENCLATURE										USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7					
2	-124 1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00								1
			A7CR21										
	-125 1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00								1
			A7CR18										
	-126 RC07GF562K	•	RESISTOR, 5600 OHMS 10%, 1/4 W	V01121									1
			745-0776-00 A7R67										
	-127 RC07GF332K	•	RESISTOR, 3300 OHMS 10%, 1/4 W	V01121									1
			745-0767-00 A7R66										
	-128 1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00								1
			A7CR15										
	-129 1N198	•	SEMICONDUCTOR DEVICE	V03508	353-0160-00								1
			A7CR13										
	-130 RC07GF102K	•	RESISTOR, 1000 OHMS 10%, 1/4 W	V01121									1
			745-0749-00 A7R31										
	-131 1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00								1
			A7CR32										
	-132 RC07GF332K	•	RESISTOR, 3300 OHMS 10%, 1/4 W	V01121									1
			745-0767-00 A7R64										
	-133 1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00								1
			A7CR34										
	-134 RC07GF102K	•	RESISTOR, 1000 OHMS 10%, 1/4 W	V01121									1
			745-0749-00 A7R34										
	-135 RC07GF392K	•	RESISTOR, 3900 OHMS 10%, 1/4 W	V01121									1
			745-0770-00 A7R35										
	-136 RC07GF333K	•	RESISTOR, 33,000 OHMS 10%, 1/4 W	V01121									1
			745-0803-00 A7R36										
	-137 RC07GF822K	•	RESISTOR, 8200 OHMS 10%, 1/4 W	V01121									1
			745-0782-00 A7R40										
	-138 RC07GF183K	•	RESISTOR, 18,000 OHMS 10%, 1/4 W	V01121									1
			745-0794-00 A7R41										
	-139 RC07GF682K	•	RESISTOR, 6800 OHMS 10%, 1/4 W	V01121									1
			745-0779-00 A7R29										
	-140 1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00								1
			A7CR23										
	-141 RC07GF183K	•	RESISTOR, 18,000 OHMS 10%, 1/4 W	V01121									1
			745-0794-00 A7R39										
	-142 RC07GF472K	•	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121									1
			745-0773-00 A7R38										
	-143 1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00							B,C D,E F	1
			A7CR35										
	-144 RN60D5111F	•	RESISTOR, 5110 OHMS 1%, 1/8 W	V75042								B,C D,F F	1
			705-6630-00 A7R72										
	-145 1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00							B,C D,E F	1
			A7CR37										
	-146 RC07GF103K	•	RESISTOR, 10,000 OHMS 10%, 1/4 W	V01121								B,C D,E F	1
			745-0785-00 A7R69										
	-147 RC07GF103K	•	RESISTOR, 10,000 OHMS 10%, 1/4 W	V01121								B,C D,E F	1
			745-0785-00 A7R73										
	-148 RC07GF473K	•	RESISTOR, 47,000 OHMS 10%, 1/4 W	V01121								B,C D,E F	1
			745-0809-00 A7R84										
	-149 CM05F101J03	•	CAPACITOR, 100 UUF 5%, 500 VDCW	V53021								B,C D,E F	1
			912-2816-00 A7C15										
	-150 RC07GF471K	•	RESISTOR, 470 OHMS 10%, 1/4 W	V01121								B,C D,E F	1
			745-0737-00 A7R45										



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FIG. -ITEM	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
2	-151	150D155X0020	A2	•	CAPACITOR, 1.5 UF 20%, 20 VDCW	V56289				1
	-152	RC07GF102K		•	RESISTOR, 1000 OHMS 10%, 1/4 W	V01121				1
	-153	RC07GF392K		•	RESISTOR, 3900 OHMS 10%, 1/4 W	V01121				1
	-154	RN60D5622F		•	RESISTOR, 56,200 OHMS 1%, 1/8 W	V75042				1
	-155	RN60D3161F		•	RESISTOR, 3160 OHMS 1%, 1/8 W	V75042				1
	-156	RC20GF221K		•	RESISTOR, 220 OHMS 10%, 1/2 W	V01121				AR
	-156	RC20GF271K		•	RESISTOR, 270 OHMS 10%, 1/2 W	V01121				AR
	-156	RC20GF331K		•	RESISTOR, 330 OHMS 10%, 1/2 W	V01121				AR
	-156	RC20GF391K		•	RESISTOR, 390 OHMS 10%, 1/2 W	V01121				AR
	-156	RC20GF471K		•	RESISTOR, 470 OHMS 10%, 1/2 W	V01121				AR
	-156	RC20GF561K		•	RESISTOR, 560 OHMS 10%, 1/2 W	V01121				AR
	-156	RC20GF681K		•	RESISTOR, 680 OHMS 10%, 1/2 W	V01121				AR
	-156	RC20GF821K		•	RESISTOR, 820 OHMS 10%, 1/2 W	V01121				AR
	-156	RC20GF102K		•	RESISTOR, 1000 OHMS 10%, 1/2 W	V01121				AR
	-156	RC20GF122K		•	RESISTOR, 1200 OHMS 10%, 1/2 W	V01121				AR
	-156	RC20GF152K		•	RESISTOR, 1500 OHMS 10%, 1/2 W	V01121				AR
	-156	RC20GF182K		•	RESISTOR, 1800 OHMS 10%, 1/2 W	V01121				AR
	-156	RC20GF222K		•	RESISTOR, 2200 OHMS 10%, 1/2 W	V01121				AR
	-156A	RC07GF222K		•	RESISTOR, 2200 OHMS 10%, 1/4 W	V01121				1
	-156B	1N756A		•	SEMICONDUCTOR DEVICE, ZENER DIO, 8.2 V 5%	V03508 353-2720-00	A7CR10	EFF		1
	-157	RC07GF100K		•	RESISTOR, 10 OHMS 10%, 1/4 W	V01121				1
	-158	RC07GF222K		•	RESISTOR, 2200 OHMS 10%, 1/4 W	V01121				1
	-159	1N458		•	SEMICONDUCTOR DEVICE	V03508 353-0205-00	A7CR9			1

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ELECTRONIC
CONTROL AMPLIFIERILLUSTRATED PARTS
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FIG. -ITEM	PART NO.	NOMENCLATURE										USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7					
2	-160	RC07GF153K	•	RESISTOR, 15,000 OHMS 10%, 1/4 W	V01121								1
				745-0791-00	A7R18								
	-161	RC07GF271K	•	RESISTOR, 270 OHMS 10%, 1/4 W	V01121								1
				745-0728-00	A7R5R								
	-162	STA552-1	•	CAPACITOR, 100,000 UUF 20%, 35 VDCW									1
				V21520 184-7408-00	A7C17	EFF THRU							
				MCN 111									
	-162	K2R2J35S	•	CAPACITOR, 2.2 UF 20%, 35 VDCW	V05397								1
				184-7397-00	A7C17	EFF MCN 112							
	-162A	K22J15S	•	CAPACITOR, 22 UF 20%, 15 VDCW	V05397								1
				184-7373-00	A7C18	EFF MCN 535							
	-163	RC07GF562K	•	RESISTOR, 5600 OHMS 10%, 1/4 W	V01121								1
				745-0776-00	A7R13								
	-164	RC07GF562K	•	RESISTOR, 5600 OHMS 10%, 1/4 W	V01121								1
				745-0776-00	A7R7								
	-165	RC07GF472K	•	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121								1
				745-0772-00	A7R8								
	-166	RC07GF102K	•	RESISTOR, 1000 OHMS 10%, 1/4 W	V01121								1
				745-0749-00	A7R86	EFF THRU MCN 111							
				ONLY									
	-167	RC07GF563K	•	RESISTOR, 56,000 OHMS 10%, 1/4 W	V01121								1
				745-0812-00	A7R24	EFF THRU MCN 111							
	-167A	RC07GF563K	•	RESISTOR, 56,000 OHMS 10%, 1/4 W	V01121								AR
				745-0812-00	A7R24	EFF MCN 112							
	-167A	RC07GF683K	•	RESISTOR, 68,000 OHMS 10%, 1/4 W	V01121								AR
				745-0815-00	A7R24	EFF MCN 112							
	-167A	RC07GF823K	•	RESISTOR, 82,000 OHMS 10%, 1/4 W	V01121								AR
				745-0818-00	A7R24	EFF MCN 112							
	-167A	RC07GF104K	•	RESISTOR, 100,000 OHMS 10%, 1/4 W	V01121								AR
				745-0821-00	A7R24	EFF MCN 112							
	-167A	RC07GF124K	•	RESISTOR, 120,000 OHMS 10%, 1/4 W	V01121								AR
				745-0824-00	A7R24	EFF MCN 112							
	-167A	RC07GF154K	•	RESISTOR, 150,000 OHMS 10%, 1/4 W	V01121								AR
				745-0827-00	A7R24	EFF MCN 112							
	-167A	RC07GF184K	•	RESISTOR, 180,000 OHMS 10%, 1/4 W	V01121								AR
				745-0830-00	A7R24	EFF MCN 112							
	-167A	RC07GF224K	•	RESISTOR, 220,000 OHMS 10%, 1/4 W	V01121								AR
				745-0833-00	A7R24	EFF MCN 112							
	-167A	RC07GF274K	•	RESISTOR, 270,000 OHMS 10%, 1/4 W	V01121								AR
				745-0836-00	A7R24	EFF MCN 112							
	-167A	RC07GF334K	•	RESISTOR, 330,000 OHMS 10%, 1/4 W	V01121								AR
				745-0839-00	A7R24	EFF MCN 112							
	-167A	RC07GF394K	•	RESISTOR, 390,000 OHMS 10%, 1/4 W	V01121								AR
				745-0842-00	A7R24	EFF MCN 112							
	-167B	RC07GF474K	•	RESISTOR, 470,000 OHMS 10%, 1/4 W	V01121								1
				745-0845-00	A7R89	EFF MCN 666 SR-18							
	-168	1N746A	•	SEMICONDUCTOR DEVICE, ZENER DIO, 3.3 V 5%									1
				V03508 353-2938-00	A7CR11								
	-169	RC07GF333K	•	RESISTOR, 33,000 OHMS 10%, 1/4 W	V01121								1
				745-0803-00	A7R14								
	-170	RC07GF562K	•	RESISTOR, 5600 OHMS 10%, 1/4 W	V01121								1
				745-0776-00	A7R15	SR-22							
	-171	1N458	•	SEMICONDUCTOR DEVICE	V03508 353-0205-00								1
				A7CR7									
	-172	RC07GF102K	•	RESISTOR, 1000 OHMS 10%, 1/4 W	V01121								1
				745-0749-00	A7R21								
	-173	RC07GF223K	•	RESISTOR, 22,000 OHMS 10%, 1/4 W	V01121								1
				745-0797-00	A7R22								
	-174	554-2182-005	•	TERMINAL BOARD									1
	-175	SKT41BRN	•	JACK, TIP	V98291 360-0258-00	A7J1							1
	-176	SKT41RED	•	JACK, TIP	V98291 360-0259-00	A7J2							1

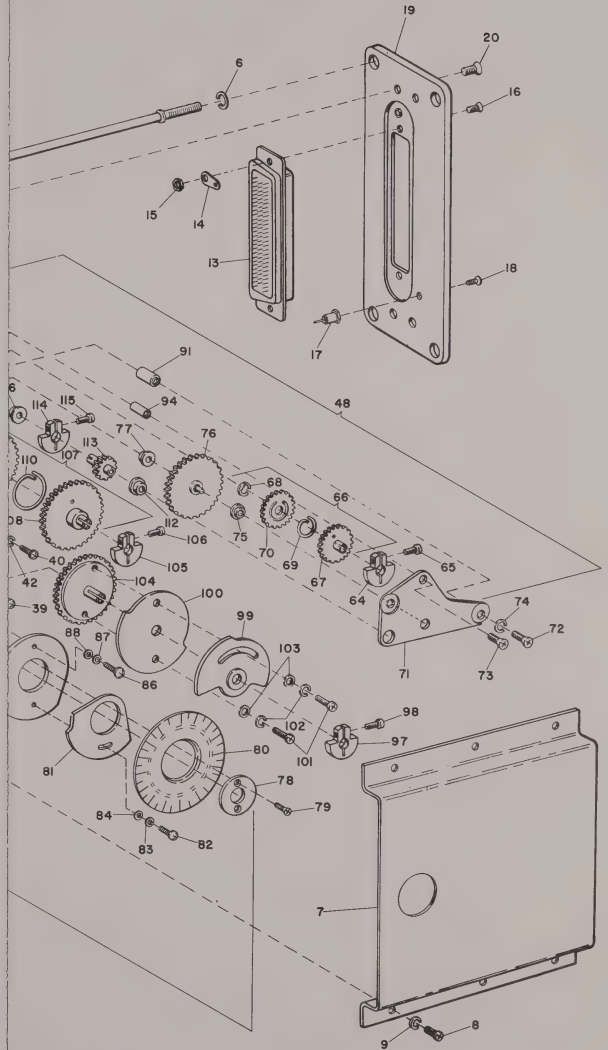


ILLUSTRATED PARTS CATALOG

SECTION IV
ELECTRONIC
CONTROL AMPLIFIER

FIG. -ITEM	PART NO.	NOMENCLATURE						USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6		
2	-177	SKT410RN	• •	JACK, TIP	V98291	360-0260-00	A7J3		1
	-178	SKT41YEL	• •	JACK, TIP	V98291	360-0261-00	A7J4		1
	-179	SKT41GRN	• •	JACK, TIP	V98291	360-0262-00	A7J5		1
	-180	SKT41BLU	• •	JACK, TIP	V98291	360-0263-00	A7J6		1
	-181	SKT41VIO	• •	JACK, TIP	V98291	360-0264-00	A7J7		1
	-182	SKT41GY	• •	JACK, TIP	V98291	360-0265-00	A7J8		1
	-183	SKT41WHT	• •	JACK, TIP	V98291	360-0266-00	A7J9		1
	-184	SKT41BLK	• •	JACK, TIP	V98291	360-0257-00	A7J10		1
	-185	SKT41BRN	• •	JACK, TIP	V98291	360-0258-00	A7J11		1
	-186	SL275-197D WHT	• •	TERMINAL, FEEDTHRU	V12615	306-1521-00			10
	-187	SL286-301D GRN	• •	TERMINAL, FEEDTHRU	V12615	306-1337-00			23
	-188	SL286-301D WHT	• •	TERMINAL, FEEDTHRU	V12615	306-1331-00			60
	-189	SL286-301D RED	• •	TERMINAL, FEEDTHRU	V12615	306-1334-00			12
	-190	SL286-301D YEL	• •	TERMINAL, FEEDTHRU	V12615	306-1336-00			20
	-191	SL286-301D RLU	• •	TERMINAL, FEEDTHRU	V12615	306-1338-00			23
	-192	SL295-315	• •	TERMINAL, STANDOFF	V12615	306-1264-00			25
	-193	554-2148-002	• •	BRACKET, ANGLE ATTACHING PARTS					1
		MS16535-52	• •	RIVET	V12014	305-1731-00			2
			- - *						
	-194	F22NCFMA1-26	• •	NUT, SELF-LKG, CLINCH	V72962				4
					333-0837-00				
	-195	554-2181-005	• •	TERMINAL BOARD					1
	-196	05-3307-51	• • •	SOCKET, TSTR	V91662	352-9903-00			22
					A7XQ1 THRU A7XQ17, A7XQ19 THRU A7XQ23				
	-197	554-2180-005	• • •	TERMINAL BOARD					1
3	-	528-0455-004		DISTANCE MECHANISM	A8	SEE FIG. 1-7			REF
				FOR NHA					
	- 1	554-7193-002	•	COVER, TOP					1
				ATTACHING PARTS					
	- 2	MS35216-12	•	SCREW	V77250	343-0133-00			2
	- 3	MS35338-78	•	WASHER	V79807	310-0279-00			2
			- - *						
	- 4	546-3813-002	•	SCREW, CAPTIVE					4
				ATTACHING PARTS					
	- 5	5133-15C	•	RING, RETAINING	V89462	340-0252-00			4
	- 6	MS35338-80	•	WASHER	V79807	310-0072-00			4
			- - *						
	- 7	554-1615-002	•	COVER, DISTANCE MECHANISM					1

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Distance Mechanism
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FIG. -ITEM	PART NO.	NOMENCLATURE						USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6		
2	-177	SKT41ORN	• •	JACK, TIP	V08291	360-0260-00	A7J3		1
	-178	SKT41YEL	• •	JACK, TIP	V08291	360-0261-00	A7J4		1
	-179	SKT41GRN	• •	JACK, TIP	V08291	360-0262-00	A7J5		1
	-180	SKT41BLU	• •	JACK, TIP	V08291	360-0263-00	A7J6		1
	-181	SKT41VIO	• •	JACK, TIP	V08291	360-0264-00	A7J7		1
	-182	SKT41GY	• •	JACK, TIP	V08291	360-0265-00	A7J8		1
	-183	SKT41WHT	• •	JACK, TIP	V08291	360-0266-00	A7J9		1
	-184	SKT41BLK	• •	JACK, TIP	V08291	360-0257-00	A7J10		1
	-185	SKT41BRN	• •	JACK, TIP	V08291	360-0258-00	A7J11		1
	-186	SL275-197D WHT	• •	TERMINAL, FEEDTHRU	V12615	306-1521-00			10
	-187	SL286-301D GRN	• •	TERMINAL, FEEDTHRU	V12615	306-1337-00			23
	-188	SL286-301D WHT	• •	TERMINAL, FEEDTHRU	V12615	306-1331-00			60
	-189	SL286-301D RFD	• •	TERMINAL, FEEDTHRU	V12615	306-1334-00			12
	-190	SL286-301D YEL	• •	TERMINAL, FEEDTHRU	V12615	306-1336-00			20
	-191	SL286-301D RLU	• •	TERMINAL, FEEDTHRU	V12615	306-1338-00			23
	-192	SL295-315	• •	TERMINAL, STANDOFF	V12615	306-1264-00			25
	-193	554-2148-002	• •	BRACKET, ANGLE ATTACHING PARTS					1
		MS16535-52	• •	RIVET	V12014	305-1731-00			2
			- - *	- - -					
	-194	F22NCFMA1-26	• •	NUT, SELF-LKG, CLINCH	V72962				4
					333-0837-00				
	-195	554-2181-005	• •	TERMINAL BOARD					1
	-196	05-3307-51	• • •	SOCKET, TSTR	V01662	352-9903-00			22
					A7XQ1 THRU A7XQ17, A7XQ19 THRU A7XQ23				
	-197	554-2180-005	• • •	TERMINAL BOARD					1
3	-	528-0455-004		DISTANCE MECHANISM	A8	SEE FIG. 1-7			REF
				FOR NHA					
	- 1	554-7193-002	•	COVER, TOP					1
				ATTACHING PARTS					
	- 2	MS35216-12	•	SCREW	V77250	343-0133-00			2
	- 3	MS35338-78	•	WASHER	V79807	310-0279-00			2
			- - *	- - -					
	- 4	546-3813-002	•	SCREW, CAPTIVE					4
				ATTACHING PARTS					
	- 5	5133-15C	•	RING, RETAINING	V89462	340-0252-00			4
	- 6	MS35338-80	•	WASHER	V79807	310-0072-00			4
			- - *	- - -					
	- 7	554-1615-002	•	COVER, DISTANCE MECHANISM					1

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ILLUSTRATED PARTS CATALOG

FIG. -ITEM	PART NO.	NOMENCLATURE						USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6		
3		ATTACHING PARTS							
- 8	MS35216-2	•	SCREW	V77250	343-0123-00				6
- 9	MS35338-77	•	WASHER	V79807	310-0275-00				6
		- - *	- - -						
- 10	546-3788-002	•	COVER, REAR						1
		ATTACHING PARTS							
- 11	COML	•	SCREW	342-0123-00					6
- 12	MS35338-77	•	WASHER	V79807	310-0275-00				6
		- - *	- - -						
- 13	DD50PC7	•	CONNECTOR, RECP	V71468	371-0118-00	ARF1			1
- 14	4007-4HOT TINNED	•	TERMINAL, LUG	V77147	304-0015-00				1
		ATTACHING PARTS FOR 13 AND 14							
- 15	68-1660-26	•	NUT, SELF-LKG, HEX.	V72962	333-0604-00				2
- 16	MS35200-3	•	SCREW	V77250	342-0133-00				2
		- - *	- - -						
- 17	RTMT12M	•	TERMINAL, STUD	V91663	306-0076-00	ARF4			1
		ATTACHING PARTS							
- 18	MS35200-12	•	SCREW	V77250	342-0044-00				1
		- - *	- - -						
- 19	554-7203-004	•	BASE, ROLLED						1
		ATTACHING PARTS							
- 20	MS35200-40	•	SCREW	V77250	342-0078-00				4
		- - *	- - -						
- 21	546-3784-002	•	PLATE, RETAINER						1
		ATTACHING PARTS							
- 22	MS35216-12	•	SCREW	V77250	343-0133-00				2
- 23	MS35338-78	•	WASHER	V79807	310-0279-00				2
		- - *	- - -						
- 24	SFR1PPK25-26	•	BEARING, BALL, ANNULAR	V83086					2
				309-0783-00					
- 25	546-3811-002	•	UNIT, DIAL						1
		ATTACHING PARTS							
- 26	COML	•	SCREW	323-0254-00					2
		- - *	- - -						
- 27	546-3790-002	•	CLAMP, GEAR						1
		ATTACHING PARTS							
- 28	324-0056-00	•	SCREW, CAP, SCH						1
		- - *	- - -						
- 29	546-3775-002	•	GEAR, TENS, 30 TEETH						1
- 30	546-3776-002	•	GEAR, TRANSFER, 12 TEETH						1
		ATTACHING PARTS							
- 31	5133-12C	•	RING, RETAINING	V89462	340-0250-00				1
		- - *	- - -						
- 32	546-3790-002	•	CLAMP, GEAR						1
		ATTACHING PARTS							
- 33	324-0056-00	•	SCREW, CAP, SCH						1
		- - *	- - -						
- 34	546-3797-002	•	GEAR, 2 TEETH						1
- 35	546-3779-002	•	GEAR, SECOND STAGE, 12 AND 60 TEETH						1
- 36	546-3781-002	•	GEAR, FIRST STAGE, 12 TEETH						1
- 37	SFR1PPK25-26	•	BEARING, BALL, ANNULAR	V83086					2
				309-0783-00					
- 38	38AS1	•	SWITCH, SENSITIVE	V91929	266-7066-00				1
			AS1						
		ATTACHING PARTS							
- 39	MS35216-3	•	SCREW	V77250	343-0124-00				1
- 40	MS35216-13	•	SCREW	V77250	343-0134-00				1



ILLUSTRATED PARTS CATALOG

SECTION IV
DISTANCE MECHANISM

FIG. -ITEM	PART NO.	NOMENCLATURE						USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6		
3	- 41	MS35338-77	•	WASHER	V79807	310-0275-00			1
	- 42	MS35338-78	•	WASHER	V79807	310-0279-00			1
	- 43	500-9073-001	•	SPACER	EFF THRU MCN 305				1
	- 43	506-5906-003	•	SPACER	EFF MCN 306				1
				- - *	- -				
	- 44	38AS2	•	SWITCH, SENSITIVE	V91929	266-7067-00			1
				AS2					
				ATTACHING PARTS					
	- 45	MS35216-13	•	SCREW	V77250	343-0134-00			2
	- 46	MS35338-78	•	WASHER	V79807	310-0279-00			2
	- 47	500-9073-001	•	SPACER	EFF THRU MCN 305				2
	- 47	506-5906-003	•	SPACER	EFF MCN 306				2
				- - *	- -				
	- 48	554-7206-005	•	GEAR ASSY					1
				ATTACHING PARTS					
	- 49	MS35216-13	•	SCREW	V77250	343-0134-00			3
	- 50	MS35216-12	•	SCREW	V77250	343-0133-00			6
	- 51	MS35338-78	•	WASHER	V79807	310-0279-00			9
				- - *	- -				
	- 52	546-3791-002	•	CLAMP, GEAR					1
				ATTACHING PARTS					
	- 53	324-0056-00	•	SCREW, CAP, SCH					1
				- - *	- -				
	- 54	546-3812-002	•	SPACER, GEAR					1
	- 55	546-3777-002	•	GEAR, TAKE-OFF, 75 TEETH					1
	- 56	546-3752-002	•	GEAR, MITER					1
				ATTACHING PARTS					
	- 57	COML	•	SFTSCREW	328-0368-00				2
				- - *	- -				
	- 58	546-3792-002	•	SHAFT, TAKE-OFF					1
				ATTACHING PARTS					
	- 59	MS16632-1012	•	RING, RETAINING	V89462	340-0112-00			1
				- - *	- -				
	- 60	SFR144PPK25-26	•	BEARING, BALL, ANNULAR	V83086				1
				309-0784-00					
	- 61	546-3809-002	•	SPACER, BRG					1
				ATTACHING PARTS					
	- 62	MS16632-1025	•	RING, RETAINING	V89462	340-0114-00			1
				- - *	- -				
	- 63	AA226-3MILL 6085	•	BEARING, SLV	V70417	309-0052-00			1
	- 64	546-3790-002	•	CLAMP, GEAR					1
				ATTACHING PARTS					
	- 65	324-0056-00	•	SCREW, CAP, SCH					1
				- - *	- -				
	- 66	546-3767-002	•	GEAR, RESOLVER					1
	- 67	546-3765-002	•	GEAR, MAIN RESOLVER, 40 TEETH					1
				ATTACHING PARTS					
	- 68	MS16632-1018	•	RING, RETAINING	V89462	340-0113-00			1
				- - *	- -				
	- 69	546-3801-002	•	SPRING, LOAD					1
	- 70	546-3766-002	•	GEAR, LOADING, 40 TEETH					1
	- 71	554-7200-003	•	PLATE, GEAR					1
				ATTACHING PARTS					
	- 72	MS35216-11	•	SCREW	V77250	343-0132-00			2
	- 73	MS35216-3	•	SCREW	V77250	343-0124-00			1



FIG. -ITEM	PART NO.	NOMENCLATURE						USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6		
3	- 74	MS35338-78	.	.	WASHER	V79807	310-0279-00		2
			.	.	- * - -				
	- 75	SFR1PPK25-26	.	.	BEARING, BALL, ANNULAR	V83086			1
			.	.	309-0783-00				
	- 76	548-3808-003	.	.	GEAR, SPUR, 12 AND 64 TEETH				1
	- 77	SFR1PPK25-26	.	.	BEARING, BALL, ANNULAR	V83086			1
			.	.	309-0783-00				
	- 78	554-0180-002	.	.	RETAINER, DIAL				1
			.	.	ATTACHING PARTS				
	- 79	COML	.	.	SCREW	322-0175-00			2
			.	.	- * - -				
	- 80	554-0186-003	.	.	DIAL, SCALE				1
	- 81	554-0184-003	.	.	CAM, SWITCH				1
			.	.	ATTACHING PARTS				
	- 82	324-0055-00	.	.	SCREW, CAP, SCH				1
	- 83	MS35338-77	.	.	WASHER	V79807	310-0275-00		1
	- 84	COML	.	.	WASHER	310-6320-00			1
			.	.	- * - -				
	- 85	554-0183-003	.	.	CAM, SWITCH				1
			.	.	ATTACHING PARTS				
	- 86	324-0055-00	.	.	SCREW, CAP, SCH				1
	- 87	MS35338-77	.	.	WASHER	V79807	310-0275-00		1
	- 88	COML	.	.	WASHER	310-6320-00			1
			.	.	- * - -				
	- 89	554-0182-003	.	.	GEAR, SPUR, 75 TEETH				1
			.	.	ATTACHING PARTS				
	- 90	MS16632-1012	.	.	RING, RETAINING	V89462	340-0112-00		1
	- 90A	546-3033-003	.	.	WASHER	FFF MCN 112			2
	- 90B	546-3029-003	.	.	WASHER	FFF MCN 112			1
			.	.	- * - -				
	- 91	546-3796-002	.	.	POST, GEAR PLATE				2
			.	.	ATTACHING PARTS				
	- 92	MS35216-11	.	.	SCREW	V77250	343-0132-00		2
	- 93	MS35338-78	.	.	WASHER	V79807	310-0279-00		2
			.	.	- * - -				
	- 94	546-3798-002	.	.	POST, STABILIZING				1
			.	.	ATTACHING PARTS				
	- 95	MS35216-3	.	.	SCREW	V77250	343-0124-00		1
	- 96	MS35338-77	.	.	WASHER	V79807	310-0275-00		1
			.	.	- * - -				
	- 97	546-3790-002	.	.	CLAMP, GEAR				1
			.	.	ATTACHING PARTS				
	- 98	324-0056-00	.	.	SCREW, CAP, SCH				1
			.	.	- * - -				
	- 99	554-0187-003	.	.	CAM, SWITCH				1
	-100	554-0185-003	.	.	CAM, SWITCH				1
			.	.	ATTACHING PARTS FOR 99 AND 100				
	-101	324-0055-00	.	.	SCREW, CAP, SCH				2
	-102	MS35338-77	.	.	WASHER	V79807	310-0275-00		2
	-103	COML	.	.	WASHER	310-6320-00			2
			.	.	- * - -				
	-104	546-3762-002	.	.	GEAR, CAM, 75 TEETH				1
	-105	546-3790-002	.	.	CLAMP, GEAR				1
			.	.	ATTACHING PARTS				
	-106	324-0056-00	.	.	SCREW, CAP, SCH				1
			.	.	- * - -				
	-107	546-3774-002	.	.	GEAR, RANGE POTENTIOMETER				1



ILLUSTRATED PARTS CATALOG

SECTION IV
DISTANCE MECHANISM

FIG. -ITEM	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
3	-108	546-3760-002	.	.	.	GEAR, SPUR, 75 TEETH ATTACHING PARTS				1
	-109	MS16632-1025	.	.	.	RING, RETAINING V89462 340-0114-00				1
			-	-	*	-				
	-110	546-3802-002	.	.	.	SPRING, LOAD				1
	-111	546-3761-002	.	.	.	GEAR, LOADING, 75 TEETH				1
	-112	SFR144PPK25- 26	.	.	.	BEARING, BALL, ANNULAR V83086 309-0784-00				1
	-113	546-3789-002	.	.	.	PINION, SPLIT HUB				1
	-114	546-3790-002	.	.	.	CLAMP, GEAR ATTACHING PARTS FOR 113 AND 114				1
	-115	324-0056-00	.	.	.	SCREW, CAP, SCH				1
			-	-	*	-				
	-116	SFR144PPK25- 26	.	.	.	BEARING, BALL, ANNULAR V83086 309-0784-00				1
	-117	546-3751-002	.	.	.	GEAR, MITER				1
	-118	546-3752-002	.	.	.	PLATE, LUBRIF LINE EFF THRU MCN 711 ONLY ATTACHING PARTS				1
	-119	MS35216-3	.	.	.	SCREW V77250 343-0124-00				2
	-120	MS35338-77	.	.	.	WASHER V79807 310-0275-00				2
			-	-	*	-				
	-121	546-3795-002	.	.	.	CLAMP, RESOLVER ATTACHING PARTS				3
	-122	324-0057-00	.	.	.	SCREW, CAP, SCH				3
	-123	MS35338-77	.	.	.	WASHER V79807 310-0275-00				3
			-	-	*	-				
	-124	AY522-46A1	.	.	.	RESOLVER, ELECTRICAL V19215 229-0246-00 ARR1				1
	-125	546-3795-002	.	.	.	CLAMP, RESOLVER ATTACHING PARTS				3
	-126	324-0055-00	.	.	.	SCREW, CAP, SCH				3
			-	-	*	-				
	-127	741-6268	.	.	.	RESISTOR, VAR, 20,000 OHMS 1%, 0.75 W V02335 381-1496-00 ARR1				1
	-128	546-3799-002	.	.	.	CLAMP, POTENTIOMETER ATTACHING PARTS				3
	-129	324-0055-00	.	.	.	SCREW, CAP, SCH				3
	-130	MS35338-77	.	.	.	WASHER V79807 310-0275-00				3
			-	-	*	-				
	-131	1120-0330	.	.	.	HOUSING, RESISTOR V02111 381-9056-00			A	1
	-131	554-7189-00	.	.	.	DUMMY RESISTOR			P	1
	-132	2522-33	.	.	.	TERMINAL, STUD V88245 306-0237-00			R	6
	-133	554-7191-002	.	.	.	SHAFT, STRAIGHT ATTACHING PARTS			R	1
	-134	MS20365D440A	.	.	.	NUT, SELF-LKG, HEX. V72962 333-0347-00			R	1
	-135	5133-12C	.	.	.	RING, RETAINING V89462 340-0250-00			R	1
	-136	COML	.	.	.	WASHER 310-0046-00			R	2
			-	-	*	-				
	-137	S518FCHHEP25 LY5	.	.	.	BEARING, BALL, ANNULAR V40920 309-1062-00			R	2
	-138	554-7192-002	.	.	.	BODY, DUMMY RESISTOR			R	1
	-139	901-45-65	.	.	.	GROMMET V75543 201-1040-00				2
	-140	554-7190-002	.	.	.	PLATE, GEAR EFF THRU MCN 711				1
	-140A	756-4438-002	.	.	.	HOUSING, GEAR EFF MCN 712				1
	-141	546-3820-003	.	.	.	SUPPORT, GEAR PLATE EFF THRU MCN 711 ONLY				1

SECTION IV

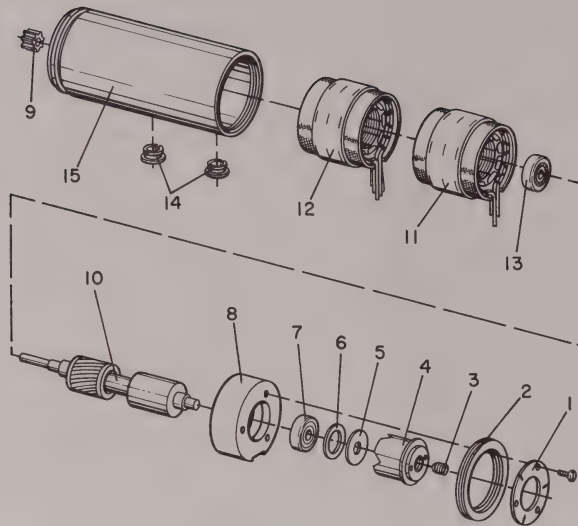
DISTANCE
MECHANISMILLUSTRATED PARTS
CATALOG

FIG. -ITEM	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
3	-142	554-7201-003	.	SUPPORT, GEAR PLATE	EFF THRU MCN					1
			.	711 ONLY						
			.	ATTACHING PARTS FOR 141 AND 142						
	-143	MS35216-13	.	SCREW V77250	343-0134-00	EFF THRU MCN				2
			.	711 ONLY						
	-144	MS35338-78	.	WASHER V79807	310-0279-00	EFF THRU				2
			.	MCN 711 ONLY						
			-	-	*	-	-			
	-145	546-3821-013	.	PLATE, GEAR						1
	-146	546-3810-002	.	CLAMP, SYNCHRO						6
			.	ATTACHING PARTS						
	-147	324-0054-00	.	SCREW, CAP, SCH						6
	-148	MS35338-77	.	WASHER V79807	310-0275-00					6
			-	-	*	-	-			
	-149	TGC11F4A067	.	SYNCHRO, XMT	V86197	229-3006-00	A8B2			1
			.	OR						
	-149	CR40911023	.	SYNCHRO, XMT	V88818	229-3007-00	A8B2			1
	-150	TGC11F4A067	.	SYNCHRO, XMT	V86197	229-3006-00	A8B3			1
			.	OR						
	-150	CR40911023	.	SYNCHRO, XMT	V88818	229-3007-00	A8B3			1
	-151	546-3794-002	.	CLAMP, MOTOR						3
			.	ATTACHING PARTS						
	-152	324-0054-00	.	SCREW, CAP, SCH						3
	-153	MS35338-77	.	WASHER V79807	310-0275-00					3
			-	-	*	-	-			
	-154	6229-41-01	.	MOTOR-TACHOMETER GENERATOR	V77045					1
			.	229-0264-00	A8MG1	SEE FIG. 4				
	-155	546-3796-002	.	POST, GEAR PLATE						2
			.	ATTACHING PARTS						
	-156	MS35200-12	.	SCREW V77250	342-0044-00					2
			-	-	*	-	-			
	-157	540-9038-003	.	POST, ELECTRICAL-MECHANICAL EQUIP.						2
			.	ATTACHING PARTS						
	-158	MS35200-12	.	SCREW V77250	342-0044-00					1
	-159	MS35216-12	.	SCREW V77250	343-0133-00					1
	-160	MS35338-78	.	WASHER V79807	310-0279-00					1
			-	-	*	-	-			
	-161	546-3782-002	.	SHAFT, TRANSFER GEAR						1
			.	ATTACHING PARTS						
	-162	MS35216-12	.	SCREW V77250	343-0133-00					1
	-163	MS35338-78	.	WASHER V79807	310-0279-00					1
			-	-	*	-	-			
	-164	546-3818-003	.	PLATE, GEAR						1



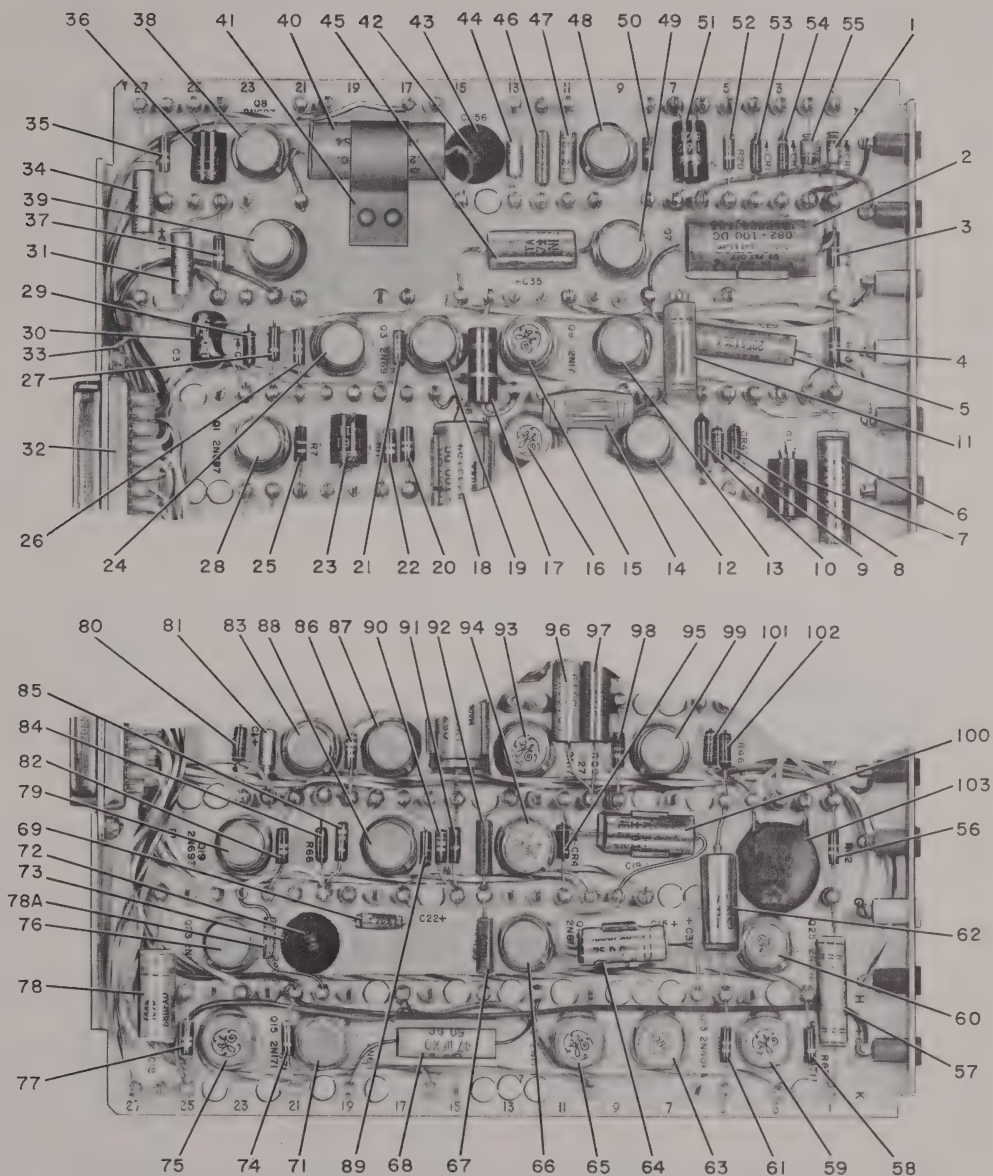
ILLUSTRATED PARTS CATALOG

SECTION IV MOTOR-TACHOMETER GENERATOR



Motor-Tachometer Generator
Figure 4

FIG. -ITEM	PART NO.	NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
		1 2 3 4 5 6 7		
4	-	6229-41-01		REF
		MOTOR-TACHOMETER GENERATOR V77045		
		229-0264-00 A8MG1 SEE FIG. 3-154		
		FOR NHA		
-	1	41378		1
		• COVER		
		ATTACHING PARTS		
		340-120-1001		3
		• SCREW, MACH.		
		- - * - -		
-	2	41376		1
		• RING, LOCK		
-	3	341-210-0001		1
		• SETSCREW		
-	4	41379		1
		• NULL ADJUSTER		
-	5	41381		1
		• DISK		
-	6	355-122-1520		1
		• SHIM		
-	7	320-250-0100		1
		• BEARING, BALL		
-	8	209328		1
		• SPACER AND SHIELD ASSY		
-	9	98849		1
		• GEAR, SPUR		
-	10	98847		1
		• ROTOR		
-	11	98846		1
		• GENERATOR STATOR ASSY		
-	12	98845		1
		• MOTOR STATOR ASSY		
-	13	320-250-0100		1
		• BEARING, BALL		
-	14	41373		1
		• GROMMET		
-	15	94683		1
		• HOUSING		

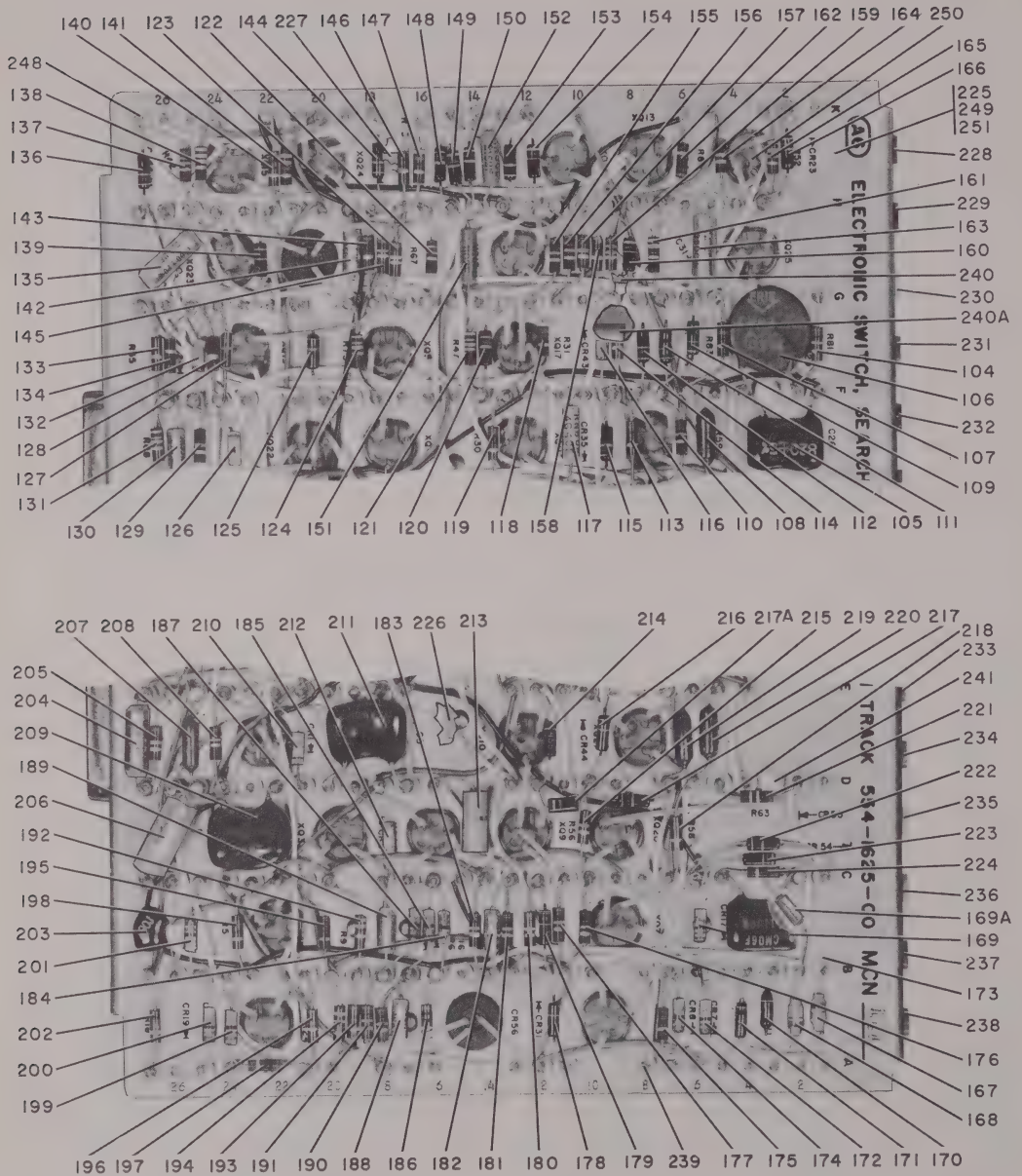


Search Track Electronic Switch (Sheet 1 of 2)
Figure 5



ILLUSTRATED PARTS CATALOG

SECTION IV
SEARCH TRACK
ELECTRONIC SWITCH



Search Track Electronic Switch (Sheet 2 of 2)
Figure 5

SECTION IV

SEARCH TRACK
ELECTRONIC SWITCHILLUSTRATED PARTS
CATALOG

FIG. -ITEM	PART NO.	NOMENCLATURE						USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6		7
5	-	554-1625-00	SEARCH TRACK ELECTRONIC SWITCH A6 SFF						REF
			FIG. 1-8 FOR NHA						
-	1	1N643	• SEMICONDUCTOR DEVICE V03508 353-2871-00						1
			A6CR13						
-	2	196P82351S4	• CAPACITOR, 82,000 UUF 5%, 100 VDCW V56289						1
			931-5008-00 A6C24						
-	3	RC07GF563K	• RESISTOR, 56,000 OHMS 10%, 1/4 W V01121						1
			745-0812-00 A6R79						
-	4	RC07GF563K	• RESISTOR, 56,000 OHMS 10%, 1/4 W V01121						1
			745-0812-00 A6R80						
-	5	CL27BE100UN3	• CAPACITOR, 10 UF +75-15%, 15 VDCW V56289						1
			184-7226-00 A6C25						
-	6	SDB1K01103M	• CAPACITOR, 100,000 UUF 20%, 100 VDCW						1
			V53021 931-4481-00 A6C27						
-	7	NS1018	• CHOPPER, SOLID V12040 354-1035-00 A6G1						1
-	8	1N458	• SEMICONDUCTOR DEVICE V03508 353-0205-00						1
			A6CR47						
-	9	1N458	• SEMICONDUCTOR DEVICE V03508 353-0205-00						1
			A6CR48						
-	10	RN60D2151F	• RESISTOR, 2150 OHMS 1%, 1/8 W V75042						1
			705-6612-00 A6R61						
-	11	763F93	• RESISTOR, 100 OHMS 10%, 1 W V10646						1
			714-1730-00 A6R39						
-	12	2N697	• TRANSISTOR V96214 352-0197-00 A6Q21						1
-	13	2N2386	• TRANSISTOR V96214 352-0427-00 A6Q20						1
-	14	763H7	• RESISTOR, 10,000 OHMS 10%, 1 W V10646						1
			714-1733-00 A6R07						
-	15	2N1711	• TRANSISTOR V96214 352-0400-00 A6Q9						1
-	16	2N1711	• TRANSISTOR V96214 352-0400-00 A6Q10						1
-	17	RC32GF181K	• RESISTOR, 180 OHMS 10%, 1 W V01121						1
			745-3321-00 A6R03						
-	18	196P82351S4	• CAPACITOR, 82,000 UUF 5%, 100 VDCW V56289						1
			931-5008-00 A6C6						
-	19	2N697	• TRANSISTOR V96214 352-0197-00 A6Q6						1
-	20	RC07GF153K	• RESISTOR, 15,000 OHMS 10%, 1/4 W V01121						1
			745-0791-00 A6R10						
-	21	RC07GF183K	• RESISTOR, 18,000 OHMS 10%, 1/4 W V01121						1
			745-0794-00 A6R0						
-	22	RC07GF153K	• RESISTOR, 15,000 OHMS 10%, 1/4 W V01121						1
			745-0791-00 A6R11						
-	23	01-611	• TRANSFORMER, PULSE V06978 664-8020-00						1
			A6T1						
-	24	2N697	• TRANSISTOR V96214 352-0197-00 A6Q3						1
-	25	RC07GF104K	• RESISTOR, 100,000 OHMS 10%, 1/4 W V01121						1
			745-0821-00 A6R7						
-	26	RC07GF103K	• RESISTOR, 10,000 OHMS 10%, 1/4 W V01121						1
			745-0785-00 A6R6						
-	27	RC07GF152K	• RESISTOR, 1500 OHMS 10%, 1/4 W V01121						1
			745-0755-00 A6R2						
-	28	2N697	• TRANSISTOR V96214 352-0197-00 A6Q1						1
-	29	1N458	• SEMICONDUCTOR DEVICE V03508 353-0205-00						1
			A6CR2						
-	30	CM05F181J03	• CAPACITOR, 180 UUF 5%, 500 VDCW V53021						1
			912-2834-00 A6C3						
-	31	K2R2J355	• CAPACITOR, 2.2 UF 20%, 35 VDCW V05397						1
			184-7397-00 A6C12						
-	32	DB25PC7	• CONNECTOR, RECP V91146 371-0170-00 A6P1						1
-	33	4040-2HOT TINNED	• TERMINAL, LUG V77147 304-0014-00						1



ILLUSTRATED PARTS CATALOG

SECTION IV
SEARCH TRACK
ELECTRONIC SWITCH

FIG.-ITEM	PART NO.	NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
		1 2 3 4 5 6 7		
5		ATTACHING PARTS FOR 32 AND 33		
	68NM26	. NUT, SELF-LKG, HFX. V72962 333-0327-00		2
	MS35200-3	. SCREW V77250 342-0133-00		2
		- - * - -		
- 34	K10J20S	. CAPACITOR, 10 UF 20%, 20 VDCW V05397 184-7375-00 A6C11		1
- 35	RC07GF223K	. RESISTOR, 22,000 OHMS 10%, 1/4 W V01121 745-0797-00 A6R21		1
- 36	01-613	. TRANSFORMER, PULSE V06978 664-8022-00 A6T3		1
- 37	RC07GF153K	. RESISTOR, 15,000 OHMS 10%, 1/4 W V01121 745-0791-00 A6R22		1
- 38	2N697	. TRANSISTOR V96214 352-0197-00 A6Q8		1
- 39	2N697	. TRANSISTOR V96214 352-0197-00 A6Q2		1
- 40	118P47492S4	. CAPACITOR, 470,000 UF 10%, 200 VDCW V56289 951-2494-00 A6C13		1
- 41	757-3079-001	. RETAINER, CAPACITOR		1
		ATTACHING PARTS FOR 40 AND 41		
	68-1660-26	. NUT, SELF-LKG, HFX. V72962 333-0604-00		2
	MS35216-3	. SCREW V77250 343-0124-00		2
		- - * - -		
- 42	2N877	. SEMICONDUCTOR DEVICE V03508 353-3328-00 A6CR56		1
- 43	MS35489-4	. GROMMET V70485 201-0001-00		1
- 44	K1J35S	. CAPACITOR, 1 UF 20%, 35 VDCW V05397 184-7398-00 A6C34		1
- 45	150D476X0020 R2	. CAPACITOR, 47 UF 20%, 20 VDCW V56289 184-7664-00 A6C35		1
- 46	RN60D2613F	. RESISTOR, 261,000 OHMS 1%, 1/8 W V75042 705-6712-00 A6R36		1
- 47	RN60D5622F	. RESISTOR, 56,200 OHMS 1%, 1/8 W V75042 705-6680-00 A6R37		1
- 48	2N697	. TRANSISTOR V96214 352-0197-00 A6Q14		1
- 49	2N697	. TRANSISTOR V96214 352-0197-00 A6Q7		1
- 50	RC07GF183K	. RESISTOR, 18,000 OHMS 10%, 1/4 W V01121 745-0794-00 A6R38		1
- 51	01-612	. TRANSFORMER, PULSE V06978 664-8021-00 A6T2		1
- 52	RC07GF471K	. RESISTOR, 470 OHMS 10%, 1/4 W V01121 745-0737-00 A6R20		1
- 53	1N751A	. SEMICONDUCTOR DEVICE, ZENER DIO, 5.1 V 5% V03508 353-2710-00 A6CR10		1
- 54	1N751A	. SEMICONDUCTOR DEVICE, ZENER DIO, 5.1 V 5% V03508 353-2710-00 A6CR12		1
- 55	1N643	. SEMICONDUCTOR DEVICE V03508 353-2871-00 A6CR15		1
- 56	RC07GF153K	. RESISTOR, 15,000 OHMS 10%, 1/4 W V01121 745-0791-00 A6R82		1
- 57	CL21CJ030TP3	. CAPACITOR, 3 UF +50-15%, 50 VDCW V56289 184-7287-00 A6C30		1
- 58	RC07GF122K	. RESISTOR, 1200 OHMS 10%, 1/4 W V01121 745-0752-00 A6R37		1
- 59	2N1711	. TRANSISTOR V96214 352-0400-00 A6Q26		1
- 60	2N1711	. TRANSISTOR V96214 352-0400-00 A6Q25		1
- 61	RC07GF103K	. RESISTOR, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 A6R86		1
- 62	150D476X0020 R2	. CAPACITOR, 47 UF 20%, 20 VDCW V56289 184-7664-00 A6C32		1
- 63	2N404A	. TRANSISTOR V96214 352-0378-00 A6Q13		1
- 64	109D107X0025 F2	. CAPACITOR, 100 UF 20%, 25 VDCW V56289 184-7797-00 A6C15		1

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ELECTRONIC SWITCHILLUSTRATED PARTS
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FIG. -ITEM	PART NO.	NOMENCLATURE						USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6		
5	- 65 2N1711	•	TRANSISTOR	V96214	352-0400-00	A6012			1
	- 66 2N697	•	TRANSISTOR	V96214	352-0197-00	A6018			1
	- 67 RN60D3162F	•	RESISTOR, 31,600 OHMS 1%, 1/8 W	V75042					1
				705-6668-00	A6R33				
	- 68 109D476X0050 F2	•	CAPACITOR, 47 UF 20%, 50 VDCW	V56289					1
				184-7788-00	A6C17				
	- 69 150D223X0035 A2	•	CAPACITOR, 22,000 UF 20%, 35 VDCW	V56289					1
				184-7673-00	A6C22				
	- 70		DELETED						
	- 71 2N697	•	TRANSISTOR	V96214	352-0197-00	A6024			1
	- 72 2N877	•	SEMICONDUCTOR DEVICE	V03508	353-3328-00				1
				A6CR53					
	- 73 MS35489-4	•	GROMMET	V70485	201-0001-00				1
	- 74 RC07GF472K	•	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121					1
				745-0773-00	A6R78				
	- 75 2N1711	•	TRANSISTOR	V96214	352-0400-00	A6015			1
	- 76 2N697	•	TRANSISTOR	V96214	352-0197-00	A6023			1
	- 77 RC07GF153K	•	RESISTOR, 15,000 OHMS 10%, 1/4 W	V01121					1
				745-0791-00	A6R41				
	- 78 109D686X0030 F2	•	CAPACITOR, 68 UF 20%, 30 VDCW	V56289					1
				184-7782-00	A6C18				
	- 78A K1J355	•	CAPACITOR, 1 UF 20%, 35 VDCW	V05397					1
				184-7398-00	A6C36	SR-21			
	- 79 2N697	•	TRANSISTOR	V96214	352-0197-00	A6019			1
	- 80 1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00				1
				A6CR51					
	- 81 STA552-1	•	CAPACITOR, 100,000 UF 20%, 35 VDCW						1
				V21520	184-7408-00	A6C1			
	- 82 RC07GF153K	•	RESISTOR, 15,000 OHMS 10%, 1/4 W	V01121					1
				745-0791-00	A6R66				
	- 83 2N697	•	TRANSISTOR	V96214	352-0197-00	A6022			1
	- 84 1N756A	•	SEMICONDUCTOR DEVICE, ZENER DIODE, 8.2 V 5%						1
				V03508	353-2722-00	A6CR61			
	- 85 RC07GF472K	•	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121					1
				745-0773-00	A6R98				
	- 86 RC07GF393K	•	RESISTOR, 39,000 OHMS 10%, 1/4 W	V01121					1
				745-0806-00	A6R68				
	- 87 2N697	•	TRANSISTOR	V96214	352-0197-00	A604			1
	- 88 2N697	•	TRANSISTOR	V96214	352-0197-00	A605			1
	- 89 1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00				1
				A6CR32					
	- 90 RC07GF473K	•	RESISTOR, 47,000 OHMS 10%, 1/4 W	V01121					1
				745-0809-00	A6R12				
	- 91 RC07GF102K	•	RESISTOR, 1000 OHMS 10%, 1/4 W	V01121					1
				745-0749-00	A6R13				
	- 92 RN60D3482F	•	RESISTOR, 34,800 OHMS 1%, 1/8 W	V75042					1
				705-6670-00	A6R32				
	- 93 2N1711	•	TRANSISTOR	V96214	352-0400-00	A6011			1
	- 94 2N404A	•	TRANSISTOR	V96214	352-0378-00	A6017			1
	- 95 1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00				1
				A6CR40					
	- 96 RN65B6190F	•	RESISTOR, 610 OHMS 1%, 1/4 W	V75042					1
				705-7086-00	A6R27				
	- 97 RN65B2151F	•	RESISTOR, 2150 OHMS 1%, 1/4 W	V75042					1
				705-7112-00	A6R28				
	- 98 RC07GF103K	•	RESISTOR, 10,000 OHMS 10%, 1/4 W	V01121					1
				745-0785-00	A6R57				
	- 99 2N697	•	TRANSISTOR	V96214	352-0197-00	A6016			1
	-100 150D476X0020 R2	•	CAPACITOR, 47 UF 20%, 20 VDCW	V56289					1
				184-7664-00	A6C19				



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FIG. -ITEM	PART NO.	NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
		1 2 3 4 5 6 7		
5.	-101 1N458	• SEMICONDUCTOR DEVICE V03508 353-0205-00 A6CR49		1
	-102 1N458	• SEMICONDUCTOR DEVICE V03508 353-0205-00 A6CR46		1
	-103 CK63AW103M	• CAPACITOR, 10,000 UUF 20%, 500 VDCW V01939 913-1188-00 A6C28		1
	-104 RC07GF104K	• RESISTOR, 100,000 OHMS 10%, 1/4 W V01121 745-0821-00 A6R81		1
	-105 CM06F821J03	• CAPACITOR, 820 UUF 5%, 500 VDCW V53021 912-2995-00 A6C26		1
	-106 CK63AW103M	• CAPACITOR, 10,000 UUF 20%, 500 VDCW V01939 913-1188-00 A6C29		1
	-107 RC07GF562K	• RESISTOR, 5600 OHMS 10%, 1/4 W V01121 745-0776-00 A6R83		1
	-108 RN60D6191F	• RESISTOR, 6100 OHMS 1%, 1/8 W V75042 705-6634-00 A6R59		1
	-109 1N458	• SEMICONDUCTOR DEVICE V03508 353-0205-00 A6CR36		1
	-110 RC07GF273K	• RESISTOR, 27,000 OHMS 10%, 1/4 W V01121 745-0800-00 A6R44		1
	-111 1N458	• SEMICONDUCTOR DEVICE V03508 353-0205-00 A6CR37		1
	-112 1N458	• SEMICONDUCTOR DEVICE V03508 353-0205-00 A6CR29		1
	-113 RC07GF102K	• RESISTOR, 1000 OHMS 10%, 1/4 W V01121 745-0749-00 A6R34		1
	-114 RC07GF103K	• RESISTOR, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 A6R43		1
	-115 1N458	• SEMICONDUCTOR DEVICE V03508 353-0205-00 A6CR35		1
	-116 1N270	• SEMICONDUCTOR DEVICE V03508 353-2018-00 A6CR43		1
	-117 RN60D4640F	• RESISTOR, 464 OHMS 1%, 1/8 W V75042 705-6580-00 A6R29		1
	-118 RC07GF472K	• RESISTOR, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 A6R31		1
	-119 RC07GF102K	• RESISTOR, 1000 OHMS 10%, 1/4 W V01121 745-0749-00 A6R30		1
	-120 1N458	• SEMICONDUCTOR DEVICE V03508 353-0205-00 A6CR39		1
	-121 RC07GF473K	• RESISTOR, 47,000 OHMS 10%, 1/4 W V01121 745-0809-00 A6R47		1
	-122 RC07GF183K	• RESISTOR, 18,000 OHMS 10%, 1/4 W V01121 745-0794-00 A6R74		1
	-123 RC07GF154K	• RESISTOR, 150,000 OHMS 10%, 1/4 W V01121 745-0827-00 A6R67		1
	-124 RC07GF473K	• RESISTOR, 47,000 OHMS 10%, 1/4 W V01121 745-0809-00 A6R73		1
	-125 1N458	• SEMICONDUCTOR DEVICE V03508 353-0205-00 A6CR60		1
	-126 1N198	• SEMICONDUCTOR DEVICE V03508 353-0160-00 A6CR50		1
	-127 1N458	• SEMICONDUCTOR DEVICE V03508 353-0205-00 A6CR62		1
	-128 RC07GF222K	• RESISTOR, 2200 OHMS 10%, 1/4 W V01121 745-0761-00 A6R72		1
	-129 RC07GF223K	• RESISTOR, 22,000 OHMS 10%, 1/4 W V01121 745-0797-00 A6R64		1
	-130 150D223X0035 A2	• CAPACITOR, 22,000 UUF 20%, 35 VDCW V56289 184-7673-00 A6C33		1



FIG. -ITEM	PART NO.	NOMENCLATURE						USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6		
5. -131	RC07GF473K	•	RESISTOR, 47,000 OHMS 10%, 1/4 W	V01121					1
			745-0809-00 A6R88						
-132	1N198	•	SEMICONDUCTOR DEVICE	V03508	353-0160-00				1
			A6CR52						
-133	RC07GF222K	•	RESISTOR, 2200 OHMS 10%, 1/4 W	V01121					1
			745-0761-00 A6R65						
-134	RC07GF222K	•	RESISTOR, 2200 OHMS 10%, 1/4 W	V01121					1
			745-0761-00 A6R71						
-135	K2R2J35S	•	CAPACITOR, 2.2 UF 20%, 35 VDCW	V05397					1
			184-7397-00 A6C20						
-136	1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00				1
			A6CR34						
-137	RC07GF183K	•	RESISTOR, 18,000 OHMS 10%, 1/4 W	V01121					1
			745-0794-00 A6R42						
-138	RC07GF393K	•	RESISTOR, 39,000 OHMS 10%, 1/4 W	V01121					1
			745-0806-00 A6R69						
-139	1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00				1
			A6CR24						
-140	RC07GF100K	•	RESISTOR, 10 OHMS 10%, 1/4 W	V01121					1
			745-0677-00 A6R76						
-141	RC07GF472K	•	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121					1
			745-0773-00 A6R40						
-142	K1J35S	•	CAPACITOR, 1 UF 20%, 35 VDCW	V05397					1
			184-7398-00 A6C23						
-143	RC07GF102K	•	RESISTOR, 1000 OHMS 10%, 1/4 W	V01121					1
			745-0749-00 A6R40						
-144	1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00				1
			A6CR42						
-145	RC07GF104K	•	RESISTOR, 100,000 OHMS 10%, 1/4 W	V01121					1
			745-0821-00 A6R50						
-146	RC07GF472K	•	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121					1
			745-0773-00 A6R75						
-147	RC07GF222K	•	RESISTOR, 2200 OHMS 10%, 1/4 W	V01121					1
			745-0761-00 A6R77						
-148	1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00				1
			A6CR25						
-149	1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00				1
			A6CR28						
-150	1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00				1
			A6CR59						
-151	RN60D1102F	•	RESISTOR, 11,000 OHMS 1%, 1/8 W	V75042					1
			705-6646-00 A6R04						
-152	RN60D2152F	•	RESISTOR, 21,500 OHMS 1%, 1/8 W	V75042					1
			705-6660-00 A6R05						
-153	1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00				1
			A6CR27						
-154	1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00				1
			A6CR41						
-155	RC07GF123K	•	RESISTOR, 12,000 OHMS 10%, 1/4 W	V01121					1
			745-0788-00 A6R45						
-156	RC07GF823K	•	RESISTOR, 82,000 OHMS 10%, 1/4 W	V01121					1
			745-0818-00 A6R48						
-157	RC07GF223K	•	RESISTOR, 22,000 OHMS 10%, 1/4 W	V01121					1
			745-0797-00 A6R96						
-158	RC07GF102K	•	RESISTOR, 1000 OHMS 10%, 1/4 W	V01121					1
			745-0749-00 A6R54						
-159	RC07GF183K	•	RESISTOR, 18,000 OHMS 10%, 1/4 W	V01121					1
			745-0794-00 A6R35						
-160	1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00				1
			A6CR30						
-161	RC07GF332K	•	RESISTOR, 3300 OHMS 10%, 1/4 W	V01121					1
			745-0767-00 A6R46						



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FIG. -ITEM	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
5	-162	RC07GF822K	•	RESISTOR, 8200 OHMS 10%, 1/4 W	V01121					1
				745-0782-00 A6R84						
	-163	K2R2J35S	•	CAPACITOR, 2.2 UF 20%, 35 VDCW	V05397					1
				184-7397-00 A6C31						
	-164	RC07GF103K	•	RESISTOR, 10,000 OHMS 10%, 1/4 W	V01121					1
				745-0785-00 A6R85						
	-165	RC07GF333K	•	RESISTOR, 33,000 OHMS 10%, 1/4 W	V01121					1
				745-0803-00 A6R52						
	-166	1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00				1
				A6CR23						
	-167	1N643	•	SEMICONDUCTOR DEVICE	V03508	353-2871-00				1
				A6CR16						
	-168	1N643	•	SEMICONDUCTOR DEVICE	V03508	353-2871-00				1
				A6CR14						
	-169	CM06F511J03	•	CAPACITOR, 510 UUF 5%, 500 VDCW	V53021					1
				912-2980-00 A6C2						
	-169A	1N270	•	SEMICONDUCTOR DEVICE	V03508	353-2018-00				1
				A6CR57 EFF MCN 257 SR-14						
	-170	1N751A	•	SEMICONDUCTOR DEVICE, ZENER DIO, 5.1 V 5%	V03508	353-2710-00	A6CR11			1
	-171	1N751A	•	SEMICONDUCTOR DEVICE, ZENER DIO, 5.1 V 5%	V03508	353-2710-00	A6CR9			1
	-172	1N270	•	SEMICONDUCTOR DEVICE	V03508	353-2018-00				1
				A6CR7						
	-173	1N270	•	SEMICONDUCTOR DEVICE	V03508	353-2018-00				1
				A6CR17						
	-174	1N270	•	SEMICONDUCTOR DEVICE	V03508	353-2018-00				1
				A6CR8						
	-175	RC07GF272K	•	RESISTOR, 2700 OHMS 10%, 1/4 W	V01121					1
				745-0764-00 A6R10						
	-176	RC07GF223K	•	RESISTOR, 22,000 OHMS 10%, 1/4 W	V01121					1
				745-0797-00 A6R55 EFF THRU MCN 111						
	-176	RC07GF104K	•	RESISTOR, 100,000 OHMS 10%, 1/4 W	V01121					1
				745-0821-00 A6R55 EFF MCN 112						
	-177	RC07GF103K	•	RESISTOR, 10,000 OHMS 10%, 1/4 W	V01121					1
				745-0785-00 A6R26						
	-178	1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00				1
				A6CR31						
	-179	1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00				1
				A6CR21						
	-180	RC07GF154K	•	RESISTOR, 150,000 OHMS 10%, 1/4 W	V01121					1
				745-0827-00 A6R25						
	-181	RC07GF103K	•	RESISTOR, 10,000 OHMS 10%, 1/4 W	V01121					1
				745-0785-00 A6R15						
	-182	STA552-1	•	CAPACITOR, 100,000 UUF 20%, 35 VDCW	V21520	184-7408-00	A6C7			1
	-183	RC07GF103K	•	RESISTOR, 10,000 OHMS 10%, 1/4 W	V01121					1
				745-0785-00 A6R16						
	-184	1N270	•	SEMICONDUCTOR DEVICE	V03508	353-2018-00				1
				A6CR6						
	-185	1N270	•	SEMICONDUCTOR DEVICE	V03508	353-2018-00				1
				A6CR5						
	-186	RC07GF100K	•	RESISTOR, 10 OHMS 10%, 1/4 W	V01121					1
				745-0677-00 A6R80						
	-187	1N270	•	SEMICONDUCTOR DEVICE	V03508	353-2018-00				1
				A6CR4						
	-188	STA552-1	•	CAPACITOR, 100,000 UUF 20%, 35 VDCW	V21520	184-7408-00	A6C7			1
	-189	STA552-1	•	CAPACITOR, 100,000 UUF 20%, 35 VDCW	V21520	184-7408-00	A6C4			1

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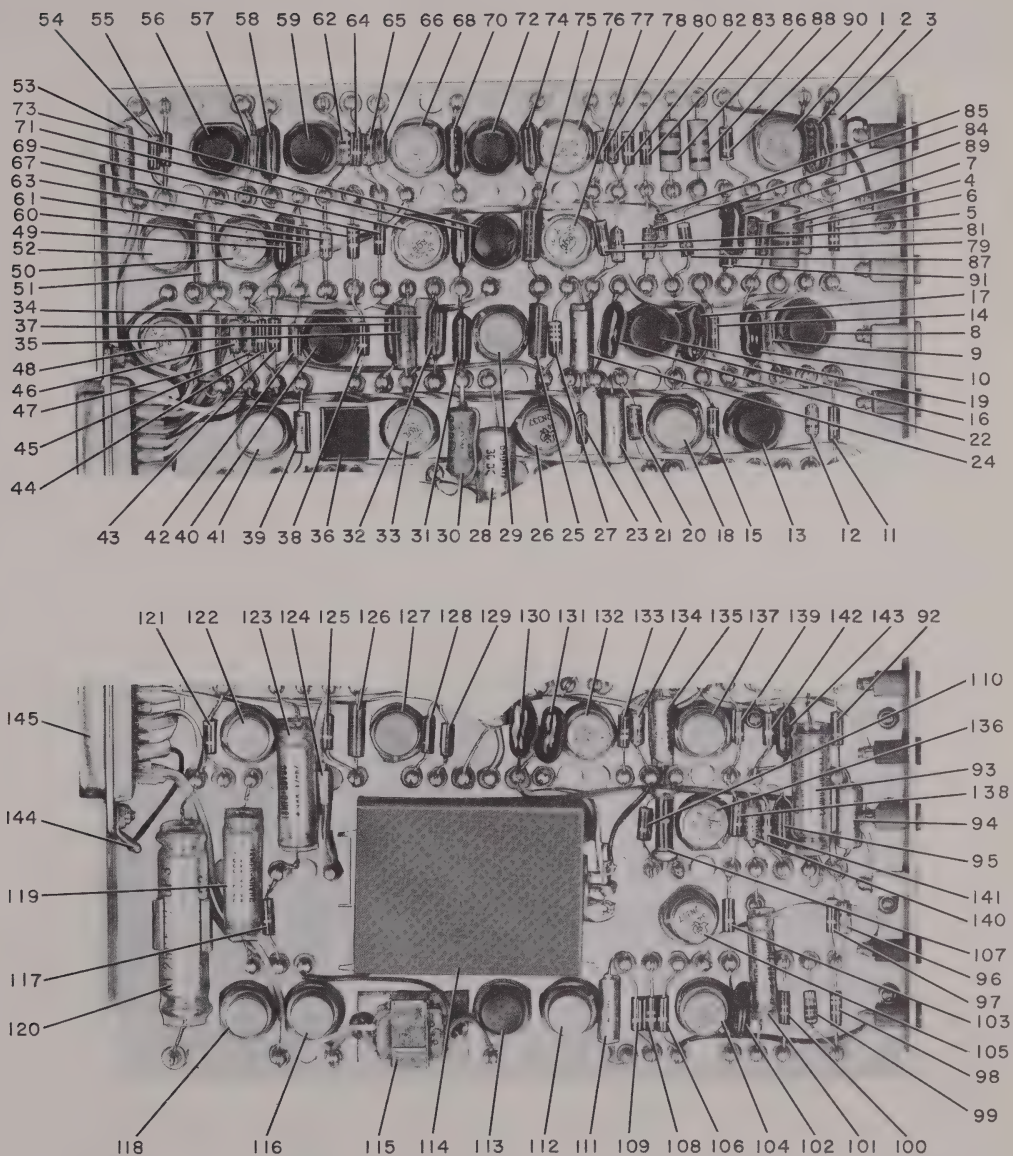
FIG. -ITEM	PART NO.	NOMENCLATURE										USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7					
5	-190	RC07GF153K	.	RESISTOR, 15,000 OHMS 10%, 1/4 W	V01121								1
				745-0791-00 A6R14									
	-191	RC07GF153K	.	RESISTOR, 15,000 OHMS 10%, 1/4 W	V01121								1
				745-0791-00 A6R8									
	-192	RC07GF332K	.	RESISTOR, 3300 OHMS 10%, 1/4 W	V01121								1
				745-0767-00 A6R02									
	-193	RC07GF102K	.	RESISTOR, 1000 OHMS 10%, 1/4 W	V01121								1
				745-0749-00 A6R91									
	-194	RC07GF472K	.	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121								1
				745-0773-00 A6R90									
	-195	RC07GF152K	.	RESISTOR, 1500 OHMS 10%, 1/4 W	V01121								1
				745-0755-00 A6R4									
	-196	RC07GF121K	.	RESISTOR, 120 OHMS 10%, 1/4 W	V01121								1
				745-0716-00 A6R24									
	-197	RC07GF102K	.	RESISTOR, 1000 OHMS 10%, 1/4 W	V01121								1
				745-0749-00 A6R23									
	-198	RC07GF272K	.	RESISTOR, 2700 OHMS 10%, 1/4 W	V01121								1
				745-0764-00 A6R5									
	-199	1N270	.	SEMICONDUCTOR DEVICE	V03508 353-2018-00								1
				A6CR20									
	-200	1N270	.	SEMICONDUCTOR DEVICE	V03508 353-2018-00								1
				A6CR19									
	-201	1N270	.	SEMICONDUCTOR DEVICE	V03508 353-2018-00								1
				A6CR18									
	-202	RC07GF101K	.	RESISTOR, 100 OHMS 10%, 1/4 W	V01121								1
				745-0713-00 A6R18									
	-203	DM10F101J	.	CAPACITOR, 100 UUF 5%, 500 VDCW	V72136								1
				912-3879-00 A6C10									
	-204	K2R2J35S	.	CAPACITOR, 2.2 UF 20%, 35 VDCW	V05397								1
				184-7397-00 A6C21									
	-205	RC07GF153K	.	RESISTOR, 15,000 OHMS 10%, 1/4 W	V01121								1
				745-0791-00 A6R70									
	-206	1N3020R	.	SEMICONDUCTOR DEVICE, ZENER DIO, 10 V 5%									1
				V03508 353-3125-00 A6CR5R									
R	-207	RN60D1002F	.	RESISTOR, 10,000 OHMS 1%, 1/8 W	V75042								AR
R				705-6644-00 A6R3									
R	-207	RN60D1052F	.	RESISTOR, 10,500 OHMS 1%, 1/8 W	V75042								AR
				705-6645-00 A6R3									
	-207	RN60D1102F	.	RESISTOR, FXD, 11,000 OHMS 1%, 1/4W									AR
				705-6646-000 A6R3									
	-208	RC07GF104K	.	RESISTOR, 100,000 OHMS 10%, 1/4 W	V01121								1
				745-0821-00 A6R1									
	-209	CM06F272G03	.	CAPACITOR, 2700 UUF 5%, 500 VDCW	V53021								1
				912-3033-00 A6C2									
	-210	1N198	.	SEMICONDUCTOR DEVICE	V03508 353-0160-00								1
				A6CR1									
	-211	CM06F242J03	.	CAPACITOR, 2400 UUF 5%, 500 VDCW	V53021								1
				912-3028-00 A6C5									
	-212	1N198	.	SEMICONDUCTOR DEVICE	V03508 353-0160-00								1
				A6CR3									
	-213	2500-28	.	COIL, 1000 UH	V99800 240-2540-00								1
	-214	1N458	.	SEMICONDUCTOR DEVICE	V03508 353-0205-00								1
				A6CR22									
	-215	RC07GF223K	.	RESISTOR, 22,000 OHMS 10%, 1/4 W	V01121								1
				745-0797-00 A6R56 EFF THRU MCN 111									
	-215	RC07GF103K	.	RESISTOR, 10,000 OHMS 10%, 1/4 W	V01121								1
				745-0785-00 A6R56 EFF MCN 112									
	-216	1N458	.	SEMICONDUCTOR DEVICE	V03508 353-0205-00								1
				A6CR44 EFF THRU MCN 111									
	-216	1N964B	.	SEMICONDUCTOR DEVICE, ZENER DIO, 13 V 5%									1
				V03508 353-3175-00 A6CR44 EFF MCN 112									



ILLUSTRATED PARTS CATALOG

SECTION IV
SEARCH TRACK
ELECTRONIC SWITCH

FIG. -ITEM	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
5	-217 1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00					1
			A6CR45 EFF THRU MCN 111							
	-217A 1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00					1
			A6CR45 EFF MCN 112							
	-218 RC07GF272K	•	RESISTOR, 2700 OHMS 10%, 1/4 W	V01121						1
			745-0764-00 A6R58							
	-219 RN60D6191F	•	RESISTOR, 6190 OHMS 1%, 1/8 W	V75042						1
			705-6634-00 A6R62							
	-220 RN60D2151F	•	RESISTOR, 2150 OHMS 1%, 1/8 W	V75042						1
			705-6612-00 A6R60							
	-221 RC07GF104K	•	RESISTOR, 100,000 OHMS 10%, 1/4 W	V01121						1
			745-0821-00 A6R63							
	-222 1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00					1
			A6CR55							
	-223 1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00					1
			A6CR54							
	-224 RC07GF102K	•	RESISTOR, 1000 OHMS 10%, 1/4 W	V01121						1
			745-0749-00 A6R17							
	-225 554-2247-005	•	TERMINAL BOARD							1
	-226 100-200-16-1	•	RETAINER, ELECTRON TUBE	V99378						2
			141-0339-00							
	-227 100-200-5-0	•	CLIP, SPG TENS	V99378	139-0746-00					1
			ATTACHING PARTS FOR 226 AND 227							
	MS16535-52	•	RIVET	V12014	305-1731-00					6
			- * -							
	-228 SKT41BRN	•	JACK, TIP	V98291	360-0258-00	A6J11				1
	-229 SKT41BLK	•	JACK, TIP	V98291	360-0257-00	A6J10				1
	-230 SKT41WHT	•	JACK, TIP	V98291	360-0266-00	A6J9				1
	-231 SKT41GY	•	JACK, TIP	V98291	360-0265-00	A6J8				1
	-232 SKT41VIO	•	JACK, TIP	V98291	360-0264-00	A6J7				1
	-233 SKT41BLU	•	JACK, TIP	V98291	360-0263-00	A6J6				1
	-234 SKT41GRN	•	JACK, TIP	V98291	360-0262-00	A6J5				1
	-235 SKT41YEL	•	JACK, TIP	V98291	360-0261-00	A6J4				1
	-236 SKTJ10RN	•	JACK, TIP	V98291	360-0260-00	A6J3				1
	-237 SKT41RED	•	JACK, TIP	V98291	360-0259-00	A6J2				1
	-238 SKT41BRN	•	JACK, TIP	V98291	360-0258-00	A6J1				1
	-239 SL295-315	•	TERMINAL, STANDOFF	V12615	306-1264-00					85
	-240 100-200-5-24	•	CLIP, SPG TENS	V99378	139-2217-00					1
	-240A 100-200-5-24	•	CLIP, SPG TENS	V99378	139-2217-00					1
			EFF MCN 610 SB-16							
			ATTACHING PARTS FOR 240 AND 240A							
	MS16535-52	•	RIVET	V12014	305-1731-00					2
			- * -							
	-241 SL275-197D WHT	•	TERMINAL, FEEDTHRU	V12615	306-1521-00					6
	-242		DELETED							
	-243		DELETED							
	-244		DELETED							
	-245		DELETED							
	-246		DELETED							
	-247		DELETED							
	-248 SL286-301D WHT	•	TERMINAL, FEEDTHRU	V12615	306-1331-00					122
	-249 554-2246-005	•	TERMINAL BOARD							1
	-250 05-3307-51	•	SOCKET, TSTR	V91662	352-9904-00					26
			A6XQ1 THRU A6XQ26							
	-251 554-2245-005	•	TERMINAL BOARD							1

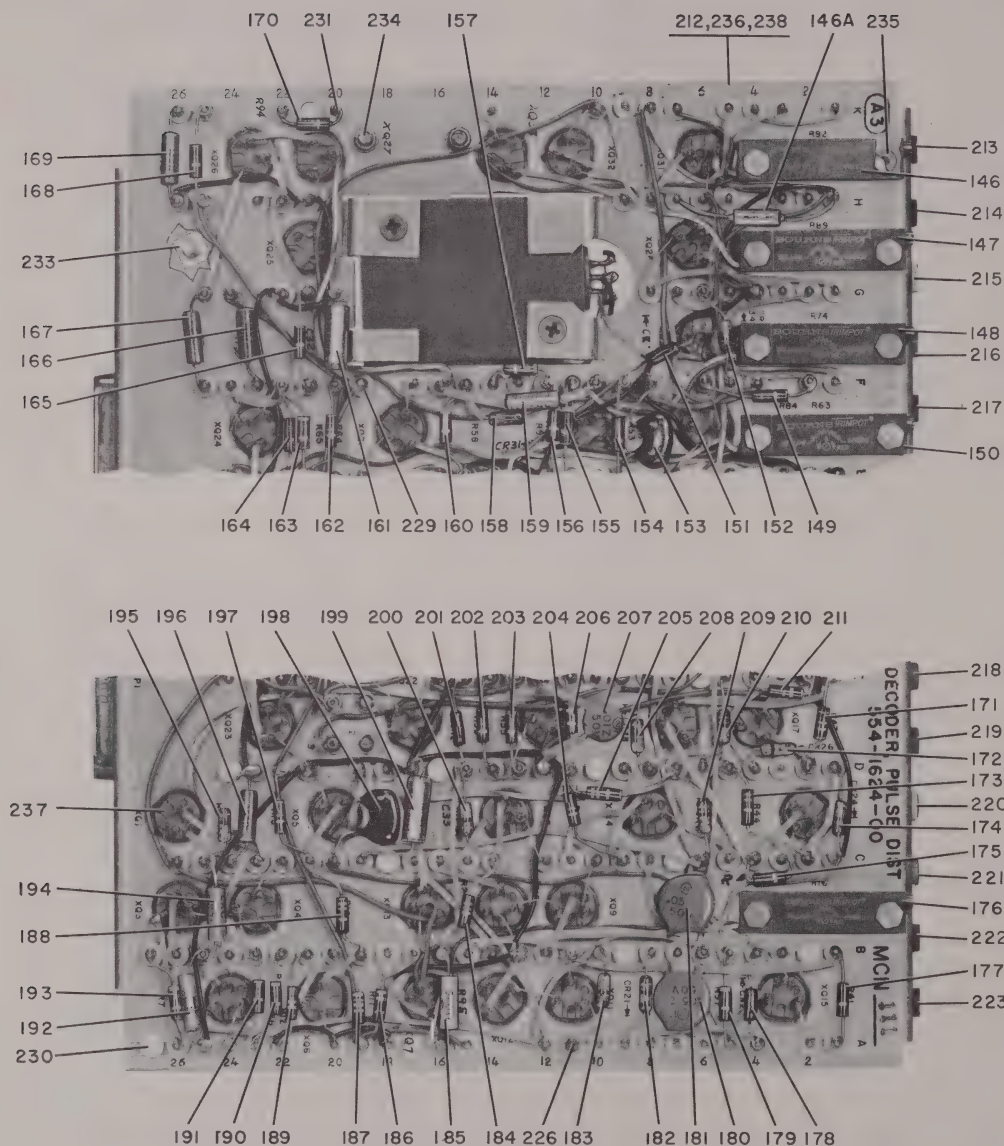


Distance Pulse Decoder (Sheet 1 of 2)
Figure 6



ILLUSTRATED PARTS CATALOG

SECTION IV
DISTANCE
PULSE DECODER



Distance Pulse Decoder (Sheet 2 of 2)
Figure 6

SECTION IV

DISTANCE
PULSE DECODERILLUSTRATED PARTS
CATALOG

FIG.-ITEM	PART NO.	NOMENCLATURE						USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6 7		
6	-	554-1624-00	DISTANCE PULSE DECODER A3 SEE FIG. 1-9 FOR NHA						REF
- 1	2N337	• TRANSISTOR V96214 352-0099-00 A3Q15						1	
- 2	CM05F221J03	• CAPACITOR, 220 UUF 5%, 500 VDCW V53021						1	
		912-2840-00 A3C13							
- 3	2500-14	• COIL, 500 UH V99800 240-2533-00 A3L3						1	
- 4	2500-14	• COIL, 500 UH V99800 240-2533-00 A3L4						1	
- 5	RC07GF103K	• RESISTOR, 10,000 OHMS 10%, 1/4 W V01121						1	
		745-0785-00 A3R42							
- 6	1N270	• SEMICONDUCTOR DEVICE V03508 353-2018-00						1	
		A3CR23							
- 7	1N270	• SEMICONDUCTOR DEVICE V03508 353-2018-00						1	
		A3CR25							
- 8	2N2048	• TRANSISTOR V96214 352-0464-00 A3Q16						1	
- 9	SPL1N904	• SEMICONDUCTOR DEVICE V03508 353-2902-00						1	
		A3CR38							
- 10	CM05F391J03	• CAPACITOR, 390 UUF 5%, 500 VDCW V53021						1	
		912-2858-00 A3C14							
- 11	RC07GF223K	• RESISTOR, 22,000 OHMS 10%, 1/4 W V01121						1	
		745-0797-00 A3R43							
- 12	SPL1N904	• SEMICONDUCTOR DEVICE V03508 353-2902-00						1	
		A3CR27							
- 13	2N2048	• TRANSISTOR V96214 352-0464-00 A3Q17						1	
- 14	RC07GF332K	• RESISTOR, 3300 OHMS 10%, 1/4 W V01121						1	
		745-0767-00 A3R48							
- 15	RC07GF222K	• RESISTOR, 2200 OHMS 10%, 1/4 W V01121						1	
		745-0761-00 A3R50							
- 16	RC07GF472K	• RESISTOR, 4700 OHMS 10%, 1/4 W V01121						1	
		745-0773-00 A3R49							
- 17	DM15F510J03	• CAPACITOR, 51 UUF 5%, 300 VDCW V72136						1	
		912-2867-00 A3C10							
- 18	2N697	• TRANSISTOR V96214 352-0197-00 A3Q18						1	
- 19	2N2048	• TRANSISTOR V96214 352-0464-00 A3Q14						1	
- 20	1N270	• SEMICONDUCTOR DEVICE V03508 353-2018-00						1	
		A3CR29							
- 21	K2R2J35S	• CAPACITOR, 2.2 UF 20%, 35 VDCW V05397						1	
		184-7397-00 A3C15							
- 22	DM15F510J03	• CAPACITOR, 51 UUF 5%, 300 VDCW V72136						1	
		912-2867-00 A3C9							
- 23	1N458	• SEMICONDUCTOR DEVICE V03508 353-0205-00						1	
		A3CR39							
- 24	K2R2J35S	• CAPACITOR, 2.2 UF 20%, 35 VDCW V05397						1	
		184-7397-00 A3C12							
- 25	RC07GF473K	• RESISTOR, 47,000 OHMS 10%, 1/4 W V01121						1	
		745-0809-00 A3R35							
- 26	2N337	• TRANSISTOR V96214 352-0099-00 A3Q20						1	
- 27	RN60D3161F	• RESISTOR, 3160 OHMS 1%, 1/8 W V75042						1	
		705-6620-00 A3R23							
- 28	109D686X0030	• CAPACITOR, 68 UF 20%, 30 VDCW V56289						1	
	F2	184-7782-00 A3C17							
- 29	2N697	• TRANSISTOR V96214 352-0197-00 A3Q8						1	
- 30	RW69V331	• RESISTOR, 330 OHMS 5%, 3 W V91637						1	
		747-5388-00 A3R3							
- 31	RN60D2151F	• RESISTOR, 2150 OHMS 1%, 1/8 W V75042						1	
		705-6612-00 A3R22							
- 32	RN60D1001F	• RESISTOR, 1000 OHMS 1%, 1/8 W V75042						1	
		705-6596-00 A3R26							
- 33	2N404A	• TRANSISTOR V96214 352-0378-00 A3Q22						1	
- 34	1N3713	• SEMICONDUCTOR DEVICE V03508 353-2048-00						1	
		A3CR13							



ILLUSTRATED PARTS CATALOG

SECTION IV
DISTANCE
PULSE DECODER

FIG. -ITEM	PART NO.	NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
		1 2 3 4 5 6 7		
- 35	1N3713	• SEMICONDUCTOR DEVICE V03508 353-2048-00 A3CR16		1
- 36	T1328	• TRANSFORMER, PULSE V98330 664-8018-00 A3T1		1
- 37	RN60D1001F	• RESISTOR, 1000 OHMS 1%, 1/8 W V75042 705-6596-00 A3R32		1
- 38	RC07GF152K	• RESISTOR, 1500 OHMS 10%, 1/4 W V01121 745-0755-00 A3R15		1
- 39	150D124X9035	• CAPACITOR, 120,000 UUF 10%, 35 VDCW A2 V56289 184-7679-00 A3C19		1
- 40	2N2048	• TRANSISTOR V96214 352-0464-00 A305		1
- 41	2N697	• TRANSISTOR V96214 352-0197-00 A3023		1
- 42	1N270	• SEMICONDUCTOR DEVICE V03508 353-2018-00 A3CR7		1
- 43	RC07GF682K	• RESISTOR, 6800 OHMS 10%, 1/4 W V01121 745-0779-00 A3R10		1
- 44	RC07GF222K	• RESISTOR, 2200 OHMS 10%, 1/4 W V01121 745-0761-00 A3R2		1
- 45	1N270	• SEMICONDUCTOR DEVICE V03508 353-2018-00 A3CR3		1
- 46	1N270	• SEMICONDUCTOR DEVICE V03508 353-2018-00 A3CR1		1
- 47	K2R2J35S	• CAPACITOR, 2.2 UF 20%, 35 VDCW V05397 184-7397-00 A3C1		1
- 48	2N404A	• TRANSISTOR V96214 352-0378-00 A301		1
- 49	CM05F221J03	• CAPACITOR, 220 UUF 5%, 500 VDCW V53021 912-2840-00 A3C5		1
- 50	2N337	• TRANSISTOR V96214 352-0099-00 A304		1
- 51	K2R2J35S	• CAPACITOR, 2.2 UF 20%, 35 VDCW V05397 184-7397-00 A3C2		1
- 52	2N697	• TRANSISTOR V96214 352-0197-00 A303		1
- 53	K2R2J35S	• CAPACITOR, 2.2 UF 20%, 35 VDCW V05397 184-7397-00 A3C2		1
- 54	RC07GF472K	• RESISTOR, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 A3R9		1
- 55	RC07GF561K	• RESISTOR, 560 OHMS 10%, 1/4 W V01121 745-0740-00 A3R8		1
- 56	2N2048	• TRANSISTOR V96214 352-0464-00 A302		1
- 57	RC07GF472K	• RESISTOR, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 A3R5		1
- 58	CM05F221J03	• CAPACITOR, 220 UUF 5%, 500 VDCW V53021 912-2840-00 A3C4		1
- 59	2N2048	• TRANSISTOR V96214 352-0464-00 A306		1
- 60	1N270	• SEMICONDUCTOR DEVICE V03508 353-2018-00 A3CR6		1
- 61	SPL1N904	• SEMICONDUCTOR DEVICE V03508 353-2902-00 A3CR9		1
- 62	SPL1N904	• SEMICONDUCTOR DEVICE V03508 353-2902-00 A3CR10		1
- 63	RC07GF332K	• RESISTOR, 3300 OHMS 10%, 1/4 W V01121 745-0767-00 A3R18		1
- 64	RC07GF222K	• RESISTOR, 2200 OHMS 10%, 1/4 W V01121 745-0761-00 A3R19		1
- 65	1N270	• SEMICONDUCTOR DEVICE V03508 353-2018-00 A3CR11		1
- 66	1N270	• SEMICONDUCTOR DEVICE V03508 353-2018-00 A3CR17		1
- 67	RC07GF271K	• RESISTOR, 270 OHMS 10%, 1/4 W V01121 745-0728-00 A3R20		1
- 68	2N404A	• TRANSISTOR V96214 352-0378-00 A307		1
- 69	2N404A	• TRANSISTOR V96214 352-0378-00 A3013		1
- 70	RN60D09091F	• RESISTOR, 9000 OHMS 1%, 1/8 W V75042 705-6642-00 A3R30		1

SECTION IV

DISTANCE
PULSE DECODERILLUSTRATED PARTS
CATALOG

FIG. -ITEM	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
6	- 71	RN60D1001F	.	RESISTOR, 1000 OHMS 1%, 1/8 W	V75042					1
			.	705-6596-00	A3R31					
	- 72	2N2048	.	TRANSISTOR V96214	352-0464-00	A3012				1
	- 73	2N2048	.	TRANSISTOR V96214	352-0464-00	A3010				1
	- 74	RN60D2151F	.	RESISTOR, 2150 OHMS 1%, 1/8 W	V75042					1
			.	705-6612-00	A3R25					
	- 75	RN60D5110F	.	RESISTOR, 511 OHMS 1%, 1/8 W	V75042					1
			.	705-6582-00	A3R24					
	- 76	2N404A	.	TRANSISTOR V96214	352-0378-00	A3011				1
	- 77	2N404A	.	TRANSISTOR V96214	352-0378-00	A3009				1
	- 78	RC07GF472K	.	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121					1
			.	745-0773-00	A3R29					
	- 79	RC07GF472K	.	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121					1
			.	745-0773-00	A3R27					
	- 80	1N270	.	SEMICONDUCTOR DEVICE	V03508	353-2018-00				1
			.	A3CR15						
	- 81	1N270	.	SEMICONDUCTOR DEVICE	V03508	353-2018-00				1
			.	A3CR14						
	- 82	RC07GF472K	.	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121					1
			.	745-0773-00	A3R28					
	- 83	RC07GF121K	.	RESISTOR, 120 OHMS 10%, 1/4 W	V01121					1
			.	745-0716-00	A3R39					
	- 84	1N270	.	SEMICONDUCTOR DEVICE	V03508	353-2018-00				1
			.	A3CR18						
	- 85	1N270	.	SEMICONDUCTOR DEVICE	V03508	353-2018-00				1
			.	A3CR19						
	- 86	240-2114-00	.	COIL, 56 UH	A3L2	EFF THRU MCN 104				1
	- 86	240-2138-00	.	COIL, 56 UH	A3L2	EFF MCN 105				1
	- 87	RC07GF472K	.	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121					1
			.	745-0773-00	A3R38					
	- 88	240-2158-00	.	COIL, 2.7 MH	A3L1	EFF THRU MCN 104				1
	- 88	240-2162-00	.	COIL, 5.6 MH	A3L1	EFF MCN 105				1
	- 89	CM05F221J03	.	CAPACITOR, 220 UUF 5%, 500 VDCW	V53021					1
			.	912-2840-00	A3C11					
	- 90	RC07GF472K	.	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121					1
			.	745-0773-00	A3R40					
	- 91	RC07GF222K	.	RESISTOR, 2200 OHMS 10%, 1/4 W	V01121					1
			.	745-0761-00	A3R36					
	- 92	RC07GF152K	.	RESISTOR, 1500 OHMS 10%, 1/4 W	V01121					1
			.	745-0755-00	A3R86					
	- 93	CL25BG400UP3	.	CAPACITOR, 40 UF +75-15%, 25 VDCW	V56289					1
			.	184-7260-00	A3C28					
	- 94	K2R2J35S	.	CAPACITOR, 2.2 UF 20%, 35 VDCW	V05397					1
			.	184-7397-00	A3C29					
	- 95	RN60D4221F	.	RESISTOR, 4220 OHMS 1%, 1/8 W	V75042					1
			.	705-6626-00	A3R85					
	- 96	1N270	.	SEMICONDUCTOR DEVICE	V03508	353-2018-00				1
			.	A3CR35						
	- 97	RC07GF472K	.	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121					1
			.	745-0773-00	A3R87					
	- 98	RC07GF332K	.	RESISTOR, 3300 OHMS 10%, 1/4 W	V01121					1
			.	745-0767-00	A3R88					
	- 99	1N270	.	SEMICONDUCTOR DEVICE	V03508	353-2018-00				1
			.	A3CR36						
	-100	RC07GF223K	.	RESISTOR, 22,000 OHMS 10%, 1/4 W	V01121					1
			.	745-0797-00	A3R78					
	-101	CL25BG100UP3	.	CAPACITOR, 10 UF +75-15%, 25 VDCW	V56289					1
			.	184-7225-00	A3C30					
	-102	CM05F221J03	.	CAPACITOR, 220 UUF 5%, 500 VDCW	V53021					1
			.	912-2840-00	A3C24	EFF THRU MCN 472				



ILLUSTRATED PARTS CATALOG

SECTION IV
DISTANCE
PULSE DECODER

FIG.-ITEM	PART NO.	NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
		1 2 3 4 5 6 7		
6	-102	DM15F510J03 . CAPACITOR, 51 UUF 5%, 300 VDCW V72136 912-2867-00 A3C24 EFF MCN 473 SB-15		1
	-103	RC07GF223K . RESISTOR, 22,000 OHMS 10%, 1/4 W V01121 745-0797-00 A3R79		1
	-104	2N404A . TRANSISTOR V96214 352-0378-00 A3Q31		1
	-105	2N337 . TRANSISTOR V96214 352-0099-00 A3Q28		1
	-106	RC07GF222K . RESISTOR, 2200 OHMS 10%, 1/4 W V01121 745-0761-00 A3R91		1
	-107	763F28 . RESISTOR, 10,000 OHMS 10%, 1 W V10646 714-0182-00 A3RT1		1
	-108	RC07GF103K . RESISTOR, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 A3R90		1
	-109	RC07GF101K . RESISTOR, 100 OHMS 10%, 1/4 W V01121 745-0713-00 A3R93		1
	-110	RC07GF471K . RESISTOR, 470 OHMS 10%, 1/4 W V01121 745-0737-00 A3R81		1
	-111	K47J6S . CAPACITOR, 47 UF 20%, 6 VDCW V05397 184-7401-00 A3C34		1
	-112	2N697 . TRANSISTOR V96214 352-0197-00 A3Q32		1
	-113	2N657A . TRANSISTOR V96214 352-0354-00 A3Q33		1
	-114	20-0157-00 . FILTER, BAND PASS V11402 673-0473-00 A3FL1 ATTACHING PARTS		1
	MS35200-11	. SCREW V77250 342-0043-00 - - * - -		2
	-115	A14352 . TRANSFORMER, A-F V70674 667-9007-00 A3T2 ATTACHING PARTS		1
	MS35216-12	. SCREW V77250 343-0133-00 - - * - -		2
	-116	2N697 . TRANSISTOR V96214 352-0197-00 A3Q27		1
	-117	RC07GF273K . RESISTOR, 27,000 OHMS 10%, 1/4 W V01121 745-0800-00 A3R69		1
	-118	2N1711 . TRANSISTOR V96214 352-0400-00 A3Q26		1
	-119	CL25BJ180UP3 . CAPACITOR, 18 UF +75-15%, 50 VDCW V56289 184-7228-00 A3C21		1
	-120	CL25BF201UP3 . CAPACITOR, 200 UF +75-15%, 15 VDCW V56289 184-7245-00 A3C22		1
	-121	RC07GF472K . RESISTOR, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 A3R67		1
	-122	2N1711 . TRANSISTOR V96214 352-0400-00 A3Q24		1
	-123	CL25BJ180UP3 . CAPACITOR, 18 UF +75-15%, 50 VDCW V56289 184-7228-00 A3C20		1
	-124	150D124X9035 . CAPACITOR, 120,000 UUF 10%, 35 VDCW A2 V56289 184-7679-00 A3C18		1
	-125	RC07GF102K . RESISTOR, 1000 OHMS 10%, 1/4 W V01121 745-0749-00 A3R62		1
	-126	RN60D3161F . RESISTOR, 3160 OHMS 1%, 1/8 W V75042 705-6620-00 A3R61		1
	-127	2N697 . TRANSISTOR V96214 352-0197-00 A3Q21		1
	-128	RC07GF821K . RESISTOR, 820 OHMS 10%, 1/4 W V01121 745-0746-00 A3R60 EFF THRU MCN 111		1
	-128	RC07GF122K . RESISTOR, 1200 OHMS 10%, 1/4 W V01121 745-0752-00 A3R60 EFF MCN 112		1
	-129	1N751A . SEMICONDUCTOR DEVICE, ZENER DIO, 5.1 V 5% V03508 353-2710-00 A3CR32		1
	-130	DM15F510J03 . CAPACITOR, 51 UUF 5%, 300 VDCW V72136 912-2867-00 A3C26		AR

SECTION IV

DISTANCE
PULSE DECODERILLUSTRATED PARTS
CATALOG

FIG. -ITEM	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
6	-130	CM05F241J03	•	CAPACITOR, 240 UUF 5%, 500 VDCW	V53021					AP
				912-2843-00 A3C26						
	-130	CM06F751J03	•	CAPACITOR, 750 UUF 5%, 500 VDCW	V53021					AP
				912-2992-00 A3C26						
	-130	CM06F102J03	•	CAPACITOR, 1000 UUF 5%, 500 VDCW	V53021					AR
				912-3001-00 A3C26						
	-131	DM15F510J03	•	CAPACITOR, 51 UUF 5%, 300 VDCW	V72136					AR
				912-2867-00 A3C27						
	-131	CM05F241J03	•	CAPACITOR, 240 UUF 5%, 500 VDCW	V53021					AR
				912-2843-00 A3C27						
	-131	CM06F751J03	•	CAPACITOR, 750 UUF 5%, 500 VDCW	V53021					AR
				912-2992-00 A3C27						
	-131	CM06F102J03	•	CAPACITOR, 1000 UUF 5%, 500 VDCW	V53021					AP
				912-3001-00 A3C27						
	-132	2N404A	•	TRANSISTOR V96214 352-0378-00	A3Q19					1
	-133	RC07GF153K	•	RESISTOR, 15,000 OHMS 10%, 1/4 W	V01121					1
				745-0791-00 A3R52						
	-134	1N270	•	SEMICONDUCTOR DEVICE V03508 353-2018-00						1
				A3CR30						
	-135	K2R2J35S	•	CAPACITOR, 2.2 UF 20%, 35 VDCW	V05397					1
				184-7397-00 A3C25						
	-136	2N404A	•	TRANSISTOR V96214 352-0378-00	A3Q30					1
	-137	2N697	•	TRANSISTOR V96214 352-0197-00	A3Q29					1
	-138	RC07GF332K	•	RESISTOR, 3300 OHMS 10%, 1/4 W	V01121					1
				745-0767-00 A3R77						
	-139	RC07GF270K	•	RESISTOR, 27 OHMS 10%, 1/4 W	V01121					1
				745-0692-00 A3R76						
	-140	150D103X0035 A2	•	CAPACITOR, 10,000 UUF 20%, 35 VDCW	V56289					1
				184-7670-00 A3C23						
	-141	RC07GF103K	•	RESISTOR, 10,000 OHMS 10%, 1/4 W	V01121					1
				745-0785-00 A3R80						
	-142	RC07GF102K	•	RESISTOR, 1000 OHMS 10%, 1/4 W	V01121					1
				745-0749-00 A3R82						
	-143	RN60D2612F	•	RESISTOR, 26,100 OHMS 1%, 1/8 W	V75042					1
				705-6664-00 A3R46						
	-144	4040-2HOT TINNED	•	TERMINAL, LUG V77147 304-0014-00						1
	-145	DB25PC7	•	CONNECTOR, RECP V91146 371-0170-00	A3P1					1
				ATTACHING PARTS						
		68NM26	•	NUT, SELF-LKG, HEX. V72962 333-0327-00						2
				EFF THRU MCN 111						
		68-1660-26	•	NUT, SELF-LKG, HEX. V72962 333-0604-00						2
				EFF MCN 112						
		MS35200-3	•	SCREW V77250 342-0133-00						2
				- - * - -						
	-146	224L1-202	•	RESISTOR, VAR, 2000 OHMS 5%, 1/2 W	V80294					1
				381-1286-00 A3R02						
				ATTACHING PARTS						
		554-2149-002	•	SCREW, MACH.						2
				- - * - -						
	-146A	K10J20S	•	CAPACITOR, 10 UF 20%, 20 VDCW	V05397					1
				184-7375-00 A3C35 EFF MCN 473 SR-15						
	-147	224L1-102	•	RESISTOR, VAR, 1000 OHMS 5%, 1/2 W	V80294					1
				381-1285-00 A3R89						
				ATTACHING PARTS						
		554-2149-002	•	SCREW, MACH.						2
				- - * - -						
	-148	224L1-501	•	RESISTOR, VAR, 500 OHMS 5%, 1/2 W	V80294					1
				381-1284-00 A3R74						



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SECTION IV

DISTANCE
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FIG. -ITEM.	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
6		ATTACHING PARTS								
	554-2149-002	.	SCREW, MACH.							2
			- * - -							
-149	RC07GF271K	.	RESISTOR, 270 OHMS 10%, 1/4 W	V01121						1
			745-0728-00 A3R84							
-150	224L1-502	.	RESISTOR, VAR, 5000 OHMS 5%, 1/2 W	V80294						1
			381-1287-00 A3R63							
		ATTACHING PARTS								
	554-2149-002	.	SCREW, MACH.							2
			- - * - -							
-151	1N270	.	SEMICONDUCTOR DEVI CF	V03508	353-2018-00					1
			A3CR34							
-152	1N715A	.	SEMICONDUCTOR DEVICE, ZENER DIO, 11 V 5%							1
			V03508 353-2729-00 A3CR37							
-153	CM05F221J03	.	CAPACITOR, 220 UUF 5%, 500 VDCW	V53021						1
			912-2840-00 A3C16							
-154	RC07GF272K	.	RESISTOR, 2700 OHMS 10%, 1/4 W	V01121						1
			745-0764-00 A3R53							
-155	RC07GF102K	.	RESISTOR, 1000 OHMS 10%, 1/4 W	V01121						1
			745-0749-00 A3R54							
-156	RC07GF472K	.	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121						1
			745-0773-00 A3R57							
-157	RC07GF472K	.	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121						1
			745-0773-00 A3R56							
-158	1N270	.	SEMICONDUCTOR DEVI CF	V03508	353-2018-00					1
			A3CR31							
-159	RN60D56R2F	.	RESISTOR, 56.2 OHMS 1%, 1/8 W	V75042						1
			705-6563-00 A3R75							
-160	RC07GF472K	.	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121						1
			745-0773-00 A3R58							
-161	K2R2J35S	.	CAPACITOR, 2.2 UF 20%, 35 VDCW	V05397						1
			184-7397-00 A3C32							
-162	RC07GF273K	.	RESISTOR, 27,000 OHMS 10%, 1/4 W	V01121						1
			745-0800-00 A3R64							
-163	RC07GF472K	.	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121						1
			745-0773-00 A3R65							
-164	RC07GF270K	.	RESISTOR, 27 OHMS 10%, 1/4 W	V01121						1
			745-0692-00 A3R66							
-165	RC07GF222K	.	RESISTOR, 2200 OHMS 10%, 1/4 W	V01121						1
			745-0761-00 A3R68							
-166	RN60D6811F	.	RESISTOR, 6810 OHMS 1%, 1/8 W	V75042						1
			705-6636-00 A3R73							
-167	RN60D4641F	.	RESISTOR, 4640 OHMS 1%, 1/8 W	V75042						1
			705-6628-00 A3R71							
-168	RC07GF102K	.	RESISTOR, 1000 OHMS 10%, 1/4 W	V01121						1
			745-0749-00 A3R70							
-169	RN60D1331F	.	RESISTOR, 1330 OHMS 1%, 1/8 W	V75042						1
			705-6602-00 A3R72							
-170	RC07GF151K	.	RESISTOR, 150 OHMS 10%, 1/4 W	V01121						1
			745-0719-00 A3R04 EFF THRU MCN 104							
-170	RC07GF221K	.	RESISTOR, 220 OHMS 10%, 1/4 W	V01121						1
			745-0725-00 A3R04 EFF MCN 105							
-171	RC07GF473K	.	RESISTOR, 47,000 OHMS 10%, 1/4 W	V01121						1
			745-0809-00 A3R47							
-172	SPL1N904	.	SEMICONDUCTOR DEVI CF	V03508	353-2902-00					1
			A3CR26							
-173	RC07GF332K	.	RESISTOR, 3300 OHMS 10%, 1/4 W	V01121						1
			745-0767-00 A3R44							

SECTION IV

DISTANCE
PULSE DECODERILLUSTRATED PARTS
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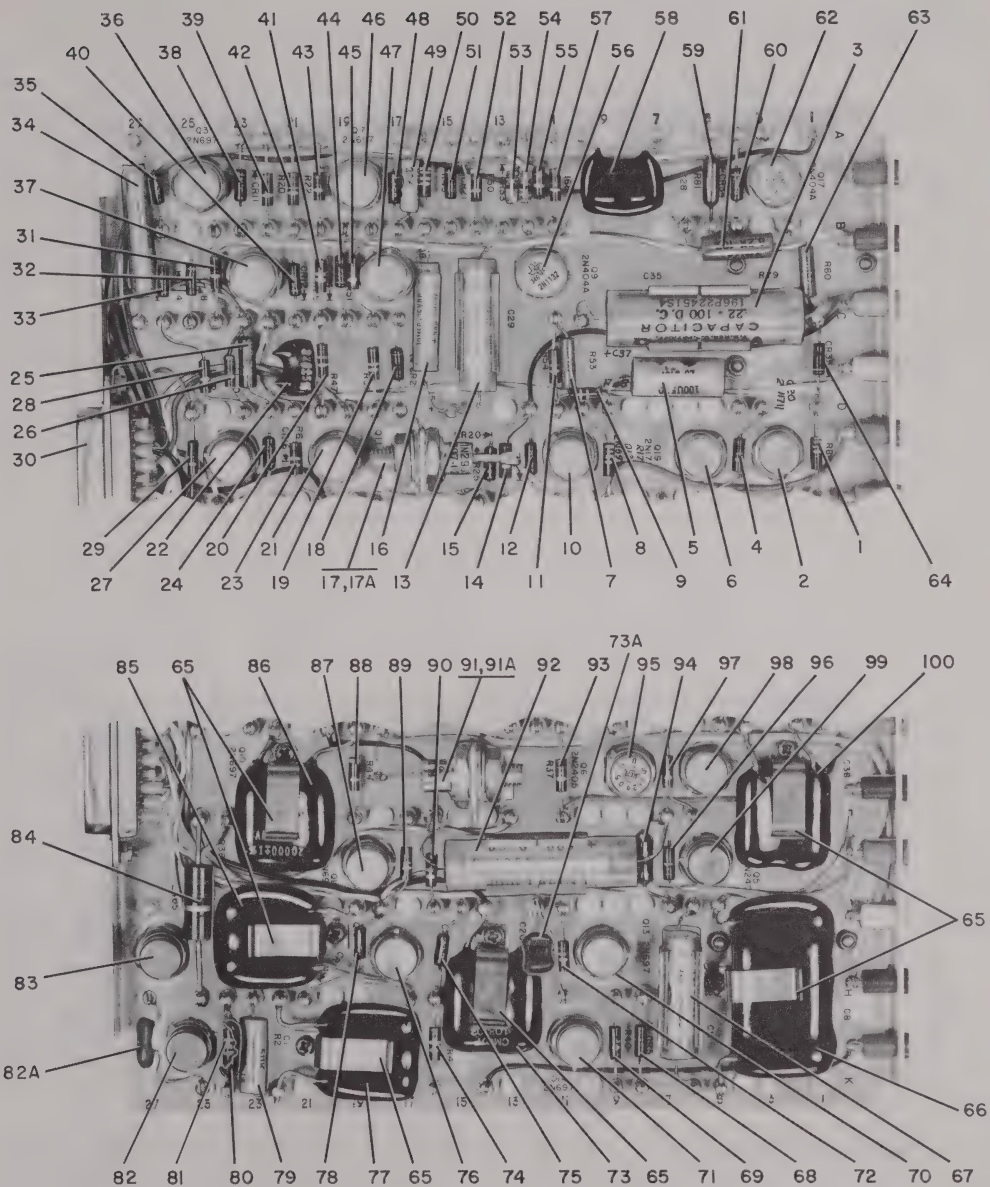
FIG. -ITEM	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
6	-174	1N270	•	SEMICONDUCTOR DEVICE	V03508	353-2018-00				1
			•	A3CR24						
	-175	RC07GF152K	•	RESISTOR, 1500 OHMS 10%, 1/4 W	V01121					1
			•	745-0755-00	A3R45					
	-176	224L1-203	•	RESISTOR, VAR, 20,000 OHMS 5%, 1/2 W						1
			•	V80294	381-1289-00	A3R16	EFF THRU			
			•	MCN 111						
	-176	224L1-503	•	RESISTOR, VAR, 50,000 OHMS 5%, 1/2 W						1
			•	V80294	381-1290-00	A3R16	EFF MCN 112			
			•	ATTACHING PARTS						
		554-2149-002	•	SCREW, MACH.						2
			•	- * -						
	-177	RC07GF222K	•	RESISTOR, 2200 OHMS 10%, 1/4 W	V01121					1
			•	745-0761-00	A3R41					
	-178	1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00				1
			•	A3CR22						
	-179	RC07GF472K	•	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121					1
			•	745-0773-00	A3R37					
	-180	55C23	•	CAPACITOR, 50,000 UUF +80-20%, 50 VDCW						1
			•	V56289	913-3885-00	A3C8				
	-181	55C23	•	CAPACITOR, 50,000 UUF +80-20%, 50 VDCW						1
			•	V56289	913-3885-00	A3C7				
	-182	1N270	•	SEMICONDUCTOR DEVICE	V03508	353-2018-00				1
			•	A3CR20						
	-183	1N270	•	SEMICONDUCTOR DEVICE	V03508	353-2018-00				1
			•	A3CR21						
	-184	RC07GF182K	•	RESISTOR, 18,000 OHMS 10%, 1/4 W	V01121					1
			•	745-0794-00	A3R21					
	-185	MF1-R 5-11K1	•	RESISTOR, 5110 OHMS 1%, 1/8 W	V19701					1
		PC117	•	705-0611-00	A3R95					
	-186	RC07GF392K	•	RESISTOR, 3900 OHMS 10%, 1/4 W	V01121					1
			•	745-0770-00	A3R33					
	-187	RC07GF473K	•	RESISTOR, 47,000 OHMS 10%, 1/4 W	V01121					1
			•	745-0809-00	A3R17					
	-188	RC07GF332K	•	RESISTOR, 3300 OHMS 10%, 1/4 W	V01121					1
			•	745-0767-00	A3R14					
	-189	RC07GF103K	•	RESISTOR, 10,000 OHMS 10%, 1/4 W	V01121					1
			•	745-0785-00	A3R12					
	-190	RC07GF472K	•	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121					1
			•	745-0773-00	A3R11					
	-191	RC07GF102K	•	RESISTOR, 1000 OHMS 10%, 1/4 W	V01121					1
			•	745-0749-00	A3R6					
	-192	1N3713	•	SEMICONDUCTOR DEVICE	V03508	353-2048-00				1
			•	A3CR5						
	-193	RC07GF472K	•	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121					1
			•	745-0773-00	A3R7					
	-194	RN60D4640F	•	RESISTOR, 464 OHMS 1%, 1/8 W	V75042					1
			•	705-6580-00	A3R4					
	-195	1N270	•	SEMICONDUCTOR DEVICE	V03508	353-2018-00				1
			•	A3CR4						
	-196	RN60D1331F	•	RESISTOR, 1330 OHMS 1%, 1/8 W	V75042					1
			•	705-6602-00	A3R1					
	-197	RC07GF223K	•	RESISTOR, 22,000 OHMS 10%, 1/4 W	V01121					1
			•	745-0797-00	A3R13					
	-198	CM05F151J03	•	CAPACITOR, 150 UUF 5%, 500 VDCW	V53021					1
			•	912-2828-00	A3C6					
	-199	K2R2J35S	•	CAPACITOR, 2.2 UF 20%, 35 VDCW	V05397					1
			•	184-7397-00	A3C33					
	-200	1N270	•	SEMICONDUCTOR DEVICE	V03508	353-2018-00				1
			•	A3CR12						



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SECTION IV
DISTANCE
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FIG. -ITEM	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.	
		1	2	3	4	5	6	7			
6	-201	1N751A	. SEMICONDUCTOR DEVICE, ZENER DIO, 5.1 V 5% V03508 353-2710-00 A3CR2								1
	-202	RC07GF561K	. RESISTOR, 560 OHMS 10%, 1/4 W V01121 745-0740-00 A3R59								1
	-203	RC07GF472K	. RESISTOR, 4700 OHMS 10%, 1/4 W V01121 745-0772-00 A3R55								1
	-204	RC07GF103K	. RESISTOR, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 A3R34								1
	-205	RC07GF332K	. RESISTOR, 3300 OHMS 10%, 1/4 W V01121 745-0767-00 A3R51								1
	-206	RC07GF222K	. RESISTOR, 2200 OHMS 10%, 1/4 W V01121 745-0761-00 A3R96								1
	-207	19C214	. CAPACITOR, 10,000 UUF +80-20%, 50 VDCW V56289 913-3887-00 A3C31								1
	-208	1N270	. SEMICONDUCTOR DEVICE V03508 353-2018-00 A3CR28								1
	-209	1N270	. SEMICONDUCTOR DEVICE V03508 353-2018-00 A3CR8								1
	-210	1N270	. SEMICONDUCTOR DEVICE V03508 353-2018-00 A3CR33								1
	-211	RC07GF153K	. RESISTOR, 15,000 OHMS 10%, 1/4 W V01121 745-0791-00 A3R83								1
	-212	554-2190-005	. TERMINAL BOARD								1
	-213	SKT41BRN	. . JACK, TIP V98291 360-0258-00 A3J11								1
	-214	SKT41BLK	. . JACK, TIP V98291 360-0257-00 A3J10								1
	-215	SKT41WHT	. . JACK, TIP V98291 360-0266-00 A3J9								1
	-216	SKT41GY	. . JACK, TIP V98291 360-0265-00 A3J8								1
	-217	SKT41VIO	. . JACK, TIP V98291 360-0264-00 A3J7								1
	-218	SKT41BLU	. . JACK, TIP V98291 360-0263-00 A3J6								1
	-219	SKT41GRN	. . JACK, TIP V98291 360-0262-00 A3J5								1
	-220	SKT41YFL	. . JACK, TIP V98291 360-0261-00 A3J4								1
	-221	SKT41ORN	. . JACK, TIP V98291 360-0260-00 A3J3								1
	-222	SKT41RED	. . JACK, TIP V98291 360-0259-00 A3J2								1
	-223	SKT41BRN	. . JACK, TIP V98291 360-0258-00 A3J1								1
	-224		DELETED								
	-225		DELETED								
	-226	SL295-315	. . TERMINAL, STANDOFF V12615 306-1264-00								32
	-227		DELETED								
	-228		DELETED								
	-229	SL300-314D	. . TERMINAL, STANDOFF V12615 306-1820-00								4
	-230	SL275-197D WHT	. . TERMINAL, FEEDTHRU V12615 306-1521-00								11
	-231	SL286-301D WHT	. . TERMINAL, FEEDTHRU V12615 306-1331-00								137
	-232		DELETED								
	-233	100-200-16-8	. . CLIP, SPG TENS V99378 139-0759-00 ATTACHING PARTS								1
		MS16535-52	. . RIVET V12014 305-1731-00 - * -								1
	-234	F22NCFMA1-40	. . NUT, SELF-LKG, CLINCH V72962 333-0839-00								2
	-235	F22NCFMA1-26	. . NUT, SELF-LKG, CLINCH V72962 333-0837-00								10
	-236	554-2189-005	. . TERMINAL BOARD								1
	-237	05-3307-51	. . . SOCKET, ISTR V91662 352-9903-00 A3XQ1 THRU A3XQ24, A3XQ26 THRU A3XQ33								32
	-238	554-2188-005	. . . TERMINAL BOARD								1

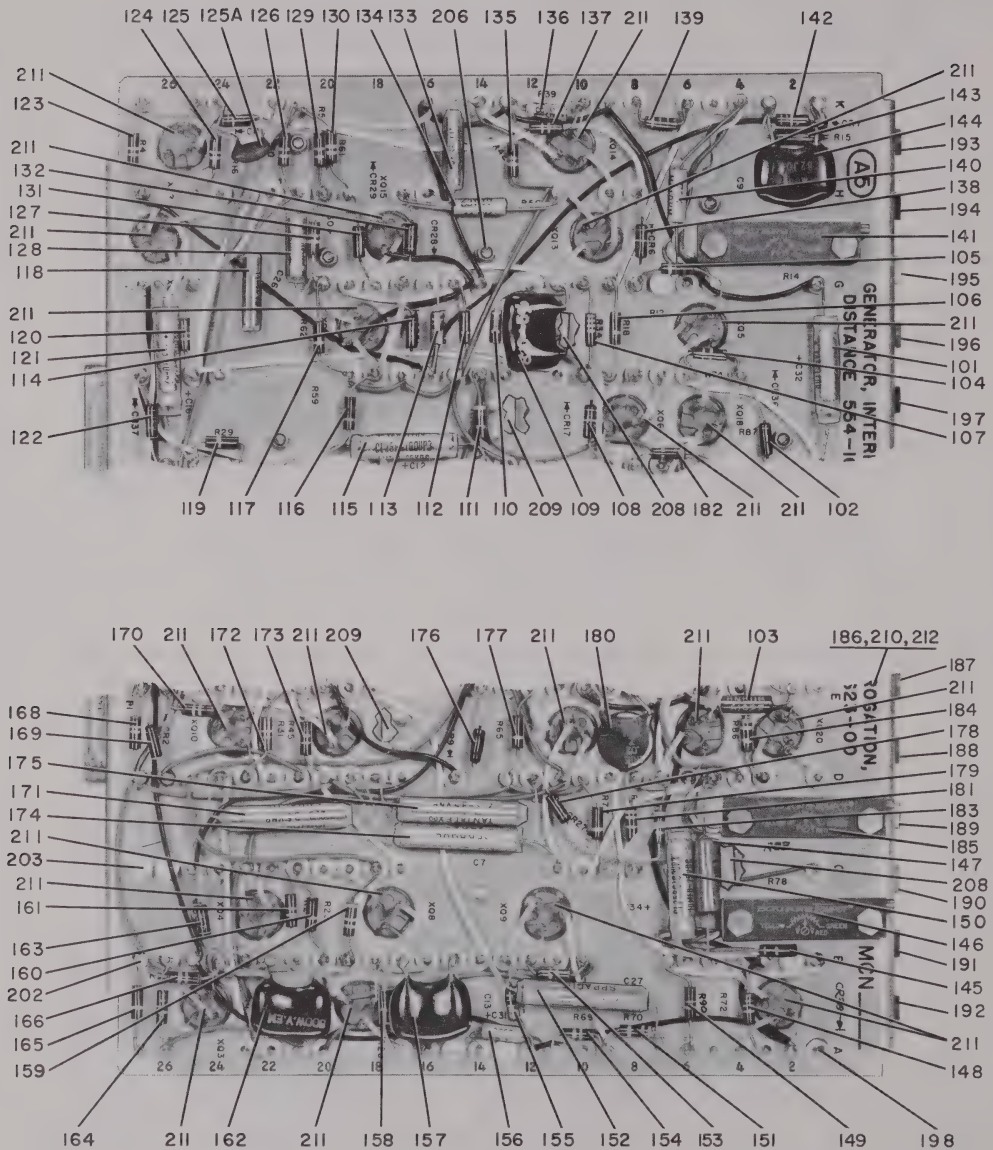


Distance Interrogation Generator (Sheet 1 of 2)
Figure 7



ILLUSTRATED PARTS CATALOG

SECTION IV DISTANCE INTERROGATION GENERATOR



Distance Interrogation Generator (Sheet 2 of 2)
Figure 7

SECTION IV

DISTANCE INTERROGATION
GENERATORILLUSTRATED PARTS
CATALOG

FIG. -ITEM	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.	
		1	2	3	4	5	6	7			
7	-	554-1623-00	DISTANCE INTERROGATION GENERATOR A5 SEE FIG. 1-10 FOR NHA								REF
	- 1	RC07GF334K	• RESISTOR, 330,000 OHMS 10%, 1/4 W V01121 745-0839-00 A5R84								1
	- 2	2N1711	• TRANSISTOR V96214 352-0400-00 A5Q20								1
	- 3	196P22451S2	• CAPACITOR, 220,000 UUF 5%, 100 VDCW V56289 931-9635-00 A5C35								1
	- 4	RC07GF103K	• RESISTOR, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 A5R85								1
	- 5	150D475X0050 B2	• CAPACITOR, 4.7 UF 20%, 25 VDCW V56289 184-8969-00 A5C37 SB-22								1
	- 6	2N1711	• TRANSISTOR V96214 352-0400-00 A5Q19								1
	- 7	RN60D1962F	• RESISTOR, 19,600 OHMS 1%, 1/8 W V75042 705-6658-00 A5R53								1
	- 8	RC07GF473K	• RESISTOR, 47,000 OHMS 10%, 1/4 W V01121 745-0809-00 A5R17								1
	- 9	RC07GF472K	• RESISTOR, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 A5R88 EFF THRU MCN 600								1
	- 10	2N697	• TRANSISTOR V96214 352-0197-00 A5Q12								1
	- 11	RC07GF273K	• RESISTOR, 27,000 OHMS 10%, 1/4 W V01121 745-0800-00 A5R54								1
	- 12	1N458	• SEMICONDUCTOR DEVICE V03508 353-0205-00 A5CR26 EFF THRU MCN 111								1
	- 12	1N270	• SEMICONDUCTOR DEVICE V03508 353-2018-00 A5CR26 EFF MCN 112								1
	- 13	CL27BJ100TN3	• CAPACITOR, 10 UF +75-15%, 50 VDCW V56289 184-7238-00 A5C29								1
	- 14	RC07GF153K	• RESISTOR, 15,000 OHMS 10%, 1/4 W V01121 745-0791-00 A5R64								1
	- 15	1N458	• SEMICONDUCTOR DEVICE V03508 353-0205-00 A5CR25								1
	- 16	K10J205	• CAPACITOR, 10 UF 20%, 20 VDCW V05397 184-7375-00 A5C15								1
	- 17	1N2999B	• SEMICONDUCTOR DEVICE, ZENER DIO, 56 V 5% V03508 353-2855-00 A5CR20								1
	- 17A	757-3019-001	• TERMINAL, LUG ATTACHING PARTS FOR 17 AND 17A								1
		COML	• WASHER 310-0059-00 - - * - -								1
	- 18	1N458	• SEMICONDUCTOR DEVICE V03508 353-0205-00 A5CR22								1
	- 19	RC07GF104K	• RESISTOR, 100,000 OHMS 10%, 1/4 W V01121 745-0821-00 A5R52								1
	- 20	RC07GF273K	• RESISTOR, 27,000 OHMS 10%, 1/4 W V01121 745-0800-00 A5R47								1
	- 21	2N697	• TRANSISTOR V96214 352-0197-00 A5Q11								1
	- 22	CM05F221J03	• CAPACITOR, 220 UUF 5%, 500 VDCW V53021 912-2840-00 A5C3								1
	- 23	RC07GF104K	• RESISTOR, 100,000 OHMS 10%, 1/4 W V01121 745-0821-00 A5R6								1
	- 24	1N458	• SEMICONDUCTOR DEVICE V03508 353-0205-00 A5CR16								1
	- 25	RN60D2372F	• RESISTOR, 23,700 OHMS 1%, 1/8 W V75042 705-6662-00 A5R43								1
	- 26	RC07GF472K	• RESISTOR, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 A5R30								1
	- 27	2N697	• TRANSISTOR V96214 352-0197-00 A5Q10								1
	- 28	RC07GF153K	• RESISTOR, 15,000 OHMS 10%, 1/4 W V01121 745-0791-00 A5R28								1
	- 29	RC07GF101K	• RESISTOR, 100 OHMS 10%, 1/4 W V01121 745-0713-00 A5R27								1



ILLUSTRATED PARTS CATALOG

SECTION IV
DISTANCE INTERROGATION
GENERATOR

FIG. -ITEM	PART NO.	NOMENCLATURE										USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7					
- 30	DB25PC7	•	CONNECTOR, RECP	V91146	371-0170-00	A5P1							1
			ATTACHING PARTS										
	68NM26	•	NUT, SELF-LKG, HEX.	V72962	333-0327-00								2
			EFF THRU MCN 111										
	68-1660-26	•	NUT, SELF-LKG, HFX.	V72962	333-0604-00								2
			FFF MCN 112										
	4040-2H0T	•	TERMINAL, LUG	V77147	304-0014-00								1
	TINNED												
	MS35200-3	•	SCREW	V77250	342-0133-00								2
			- - * - -										
- 31	RC07GF102K	•	RESISTOR, 1000 OHMS 10%, 1/4 W	V01121									1
			745-0749-00 A5R8	EFF THRU MCN 111									
- 31	RC07GF100K	•	RESISTOR, 10 OHMS 10%, 1/4 W	V01121									1
			745-0677-00 A5R8	EFF MCN 112 ONLY									
- 32	1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00								1
			A5CR4	EFF THRU MCN 111									
- 32	1N270	•	SEMICONDUCTOR DEVICE	V03508	353-2018-00								1
			A5CR4	EFF MCN 112									
- 33	1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00								1
			A5CR15	EFF THRU MCN 111									
- 33	1N270	•	SEMICONDUCTOR DEVICE	V03508	353-2018-00								1
			A5CR15	EFF MCN 112									
- 34	151D235X0035	•	CAPACITOR, 2.3 UF 20%, 35 VDCW	V56289									1
	B2		184-8268-00 A5C4										
- 35	1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00								1
			A5CR3	EFF THRU MCN 111									
- 35	1N270	•	SEMICONDUCTOR DEVICE	V03508	353-2018-00								1
			A5CR3	EFF MCN 112									
- 36	2N697	•	TRANSISTOR	V96214	352-0197-00	A5Q3							1
- 37	2N697	•	TRANSISTOR	V96214	352-0197-00	A5Q4							1
- 38	1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00								1
			A5CR11	EFF THRU MCN 111									
- 38	1N270	•	SEMICONDUCTOR DEVICE	V03508	353-2018-00								1
			A5CR11	EFF MCN 112									
- 39	RC07GF822K	•	RESISTOR, 8200 OHMS 10%, 1/4 W	V01121									1
			745-0782-00 A5R20										
- 40	1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00								1
			A5CR12	EFF THRU MCN 111									
- 40	1N270	•	SEMICONDUCTOR DEVICE	V03508	353-2018-00								1
			A5CR12	EFF MCN 112									
- 41	RC07GF103K	•	RESISTOR, 10,000 OHMS 10%, 1/4 W	V01121									1
			745-0785-00 A5R25										
- 42	RC07GF183K	•	RESISTOR, 18,000 OHMS 10%, 1/4 W	V01121									1
			745-0794-00 A5R22										
- 43	RC07GF472K	•	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121									1
			745-0773-00 A5R24										
- 44	1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00								1
			A5CR14										
- 45	RC07GF101K	•	RESISTOR, 100 OHMS 10%, 1/4 W	V01121									1
			745-0713-00 A5R51										
- 46	2N697	•	TRANSISTOR	V96214	352-0197-00	A5Q7							1
- 47	2N697	•	TRANSISTOR	V96214	352-0197-00	A5Q8							1
- 48	1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00								1
			A5CR13										
- 49	MF1-8 20K1PC	•	RESISTOR, 20,000 OHMS 1%, 1/8 W	V19701									AR
	TT7		705-0618-00 A5R48										
- 49	MF1800V2	•	RESISTOR, FXD, 21,000 OHMS 1%, 1/4 W	V91637									AR
	1501F		705-1455-100 A5R48										
- 50	RC07GF473K	•	RESISTOR, 47,000 OHMS 10%, 1/4 W	V01121									1
			745-0809-00 A5R49										

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FIG. -ITEM	PART NO.	NOMENCLATURE						USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6		
7	- 51 1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00				1
			A5CR21						
	- 52 RC07GF472K	•	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121					1
			745-0773-00 A5R50						
	- 53 1N270	•	SEMICONDUCTOR DEVICE	V03508	353-2018-00				1
			A5CR33						
	- 54 1N270	•	SEMICONDUCTOR DEVICE	V03508	353-2018-00				1
			A5CR32						
	- 55 RC07GF562K	•	RESISTOR, 5600 OHMS 10%, 1/4 W	V01121					1
			745-0776-00 A5R67 EFF THRU MCN 256						
	- 55 RC07GF103K	•	RESISTOR, 10,000 OHMS 10%, 1/4 W	V01121					1
			745-0785-00 A5R67 EFF MCN 257						
	- 56 2N1132	•	TRANSISTOR V96214	352-0220-00	A5Q9				1
	- 57 RC07GF821K	•	RESISTOR, 820 OHMS 10%, 1/4 W	V01121					1
			745-0746-00 A5R68						
	- 58 CM06F472J03	•	CAPACITOR, 4700 UUF 5%, 500 VDCW	V53021					1
			912-3052-00 A5C28						
	- 59 RN60D3832F	•	RESISTOR, 38,300 OHMS 1%, 1/8 W	V75042					1
			705-6672-00 A5R81						
	- 60 1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00				1
			A5CR34						
	- 61 T1TM1-4 8-2K	•	RESISTOR, 8200 OHMS 10%, 1/4 W	V96214					1
	PORM10PCT		714-2371-00 A5R79						
	- 62 2N404A	•	TRANSISTOR V96214	352-0378-00	A5Q17				1
	- 63 RN60D2613F	•	RESISTOR, 261,000 OHMS 1%, 1/8 W	V75042					1
			705-6712-00 A5R80 EFF THRU MCN 111						
	- 63 MEA274-000F	•	RESISTOR, 274,000 OHMS 1%, 1/8 W	V75042					1
			724-0152-00 A5R80 EFF MCN 112						
	- 64 1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00				1
			A5CR35						
	- 65 554-2150-002	•	RETAINER, CAPACITOR						6
			ATTACHING PARTS						
	MS35216-2	•	SCREW V77250	343-0123-00					6
			- - * - -						
	- 66 DM42F403F03	•	CAPACITOR, 40,000 UUF 1%, 500 VDCW	V72136					1
			912-3140-00 A5C8						
	- 67 CL37BQ010MN3	•	CAPACITOR, 1 UF 20%, 150 VDCW	V56289					1
			184-7236-00 A5C11						
	- 68 1N459	•	SEMICONDUCTOR DEVICE	V03508	353-0206-00				1
			A5CR5						
	- 69 RC07GF103K	•	RESISTOR, 10,000 OHMS 10%, 1/4 W	V01121					1
			745-0785-00 A5R40						
	- 70 2N697	•	TRANSISTOR V96214	352-0197-00	A5Q13				1
	- 71 2N697	•	TRANSISTOR V96214	352-0197-00	A5Q14				1
	- 72 RC07GF273K	•	RESISTOR, 27,000 OHMS 10%, 1/4 W	V01121					1
			745-0800-00 A5R32						
	- 73 CM07F103J03	•	CAPACITOR, 10,000 UUF 5%, 500 VDCW	V53021					1
			912-2735-00 A5C20						
	- 73A DM10F331J	•	CAPACITOR, FXD, 330 PF 5%, 100 VDCW	V72136					1
			912-3915-000 A5C40						
	- 74 RC07GF104K	•	RESISTOR, 100,000 OHMS 10%, 1/4 W	V01121					1
			745-0821-00 A5R41						
	- 75 1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00				1
			A5CR23						
	- 76 2N697	•	TRANSISTOR V96214	352-0197-00	A5Q15				1
	- 77 DM30F123F03	•	CAPACITOR, 12,000 UUF 1%, 300 VDCW	V72136					1
			912-3070-00 A5C1						
	- 78 1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00				1
			A5CR30						
	- 79 MF1-4T7-511K	•	RESISTOR, 511,000 OHMS 1%, 1/4 W	V19701					1
	1PCT		705-4507-00 A5R2						



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FIG. -ITEM	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
7	- 80	CM05F391J03	•	CAPACITOR, 390 UUF 5%, 500 VDCW	V53021					1
				912-2858-00	A5C2					
	- 81	RC07GF224K	•	RESISTOR, 220,000 OHMS 10%, 1/4 W	V01121					1
				745-0833-00	A5R3					
	- 82	2N2405	•	TRANSISTOR V96214	352-0479-00	A5Q2				1
	- 82A	CM05F241J03	•	CAPACITOR, 240 UUF 5%, 500 VDCW	V53021					1
				912-2843-00	A5C39	EFF MCN 665	SB-1A			
	- 83	2N2405	•	TRANSISTOR V96214	352-0479-00	A5Q1				1
	- 84	RC32GF272K	•	RESISTOR, 2700 OHMS 10%, 1 W	V01121					1
				745-3370-00	A5R38	EFF THRU MCN 111				
	- 84	47682DET2550	•	RESISTOR, 2550 OHMS 1%, 2.5 W	V91637					1
				746-9436-00	A5R38	EFF MCN 112				
	- 85	DM30F203F03	•	CAPACITOR, 20,000 UUF 1%, 300 VDCW	V72136					1
				912-3073-00	A5C25					
	- 86	DM30F203F03	•	CAPACITOR, 20,000 UUF 1%, 300 VDCW	V72136					1
				912-3073-00	A5C17					
	- 87	2N697	•	TRANSISTOR V96214	352-0197-00	A5Q16				1
	- 88	RC07GF472K	•	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121					1
				745-0773-00	A5R44					
	- 89	RC07GF183K	•	RESISTOR, 18,000 OHMS 10%, 1/4 W	V01121					1
				745-0794-00	A5R63					
	- 90	RC07GF123K	•	RESISTOR, 12,000 OHMS 10%, 1/4 W	V01121					1
				745-0788-00	A5R33					
	- 91	1N2989B	•	SEMICONDUCTOR DEVICE, ZENER DIO, 30 V 5%						1
				V03508	353-1369-00	A5CR19				
	- 91A	757-3019-001	•	TERMINAL, LUG						1
				ATTACHING PARTS FOR 91 AND 91A						
		COML	•	WASHER 310-0059-00						1
				- - * - -						
R	- 92	600D126F150 DE4	•	CAPACITOR, 12 UF 50-10%, 150 VDCW	V56289					1
				183-1277-540	A5C23					
	- 93	RC07GF681K	•	RESISTOR, 680 OHMS 10%, 1/4 W	V01121					1
				745-0743-00	A5R37	EFF THRU MCN 111				
	- 93	RC32GF681K	•	RESISTOR, 680 OHMS 10%, 1 W	V01121					1
				745-3345-00	A5R37	EFF MCN 112				
	- 94	RN60D9091F	•	RESISTOR, 9090 OHMS 1%, 1/8 W	V75042					1
				705-6642-00	A5R35					
	- 95	2N2405	•	TRANSISTOR V96214	352-0479-00	A5Q6				1
	- 96	1N459	•	SEMICONDUCTOR DEVICE V03508	353-0206-00					1
				A5CR8						
	- 97	RC07GF101K	•	RESISTOR, 100 OHMS 10%, 1/4 W	V01121					1
				745-0713-00	A5R73					
	- 98	2N1711	•	TRANSISTOR V96214	352-0400-00	A5Q18				1
	- 99	2N2405	•	TRANSISTOR V96214	352-0479-00	A5Q5				1
	-100	CM07F822J03	•	CAPACITOR, 8200 UUF 5%, 500 VDCW	V53021					1
				912-2729-00	A5C36					
	-101	K10J20S	•	CAPACITOR, 10 UF 20%, 20 VDCW	V05397					1
				184-7375-00	A5C32					
	-102	1N458	•	SEMICONDUCTOR DEVICE V03508	353-0205-00					1
				A5CR36						
	-103	RN60D6192F	•	RESISTOR, 61,900 OHMS 1%, 1/8 W	V75042					1
				705-6682-00	A5R87	EFF THRU MCN 111				
	-103	RN60D7152F	•	RESISTOR, 71,500 OHMS 1%, 1/8 W	V75042					1
				705-6685-00	A5R87	EFF MCN 112				
	-104	RC07GF104K	•	RESISTOR, 100,000 OHMS 10%, 1/4 W	V01121					1
				745-0821-00	A5R74					
	-105	RC07GF181K	•	RESISTOR, 180 OHMS 10%, 1/4 W	V01121					1
				745-0722-00	A5R12					



FIG. -ITEM	PART NO.	NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
		1 2 3 4 5 6 7		
7	-106	RC07GF102K . RESISTOR, 1000 OHMS 10%, 1/4 W V01121 745-0749-00 A5R18		1
	-107	RC07GF334K . RESISTOR, 330,000 OHMS 10%, 1/4 W V01121 745-0839-00 A5R34		1
	-108	1N459 . SEMICONDUCTOR DEVICE V03508 353-0206-00 A5CR17 EFF THRU MCN 659		1
	-108	SPL1N459 . SEMICONDUCTOR DEVICE V03508 353-3571-00 A5CR17 EFF MCN 660		1
	-109	CM06F821J03 . CAPACITOR, 820 UHF 5%, 500 VDCW V53021 912-2995-00 A5C18		1
	-110	RC07GF472K . RESISTOR, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 A5R26		1
	-111	RC07GF472K . RESISTOR, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 A5R19		1
	-112	RC07GF152K . RESISTOR, 1500 OHMS 10%, 1/4 W V01121 745-0755-00 A5R55		1
	-113	1N270 . SEMICONDUCTOR DEVICE V03508 353-2018-00 A5CR18		1
	-114	1N458 . SEMICONDUCTOR DEVICE V03508 353-0205-00 A5CR31		1
	-115	K10J20S . CAPACITOR, 10 UF 20%, 20 VDCW V05307 184-7375-00 A5C12		1
	-116	RC07GF272K . RESISTOR, 2700 OHMS 10%, 1/4 W V01121 745-0764-00 A5R59		1
	-117	RC07GF152K . RESISTOR, 1500 OHMS 10%, 1/4 W V01121 745-0755-00 A5R62		1
	-118	151D114X0035 . CAPACITOR, 110,000 UHF 20%, 35 VDCW A2 V56289 184-8250-00 A5C26		1
	-119	RC07GF222K . RESISTOR, 2200 OHMS 10%, 1/4 W V01121 745-0761-00 A5R29		1
	-120	RC07GF273K . RESISTOR, 27,000 OHMS 10%, 1/4 W V01121 745-0800-00 A5R1		1
	-121	K10J20S . CAPACITOR, 10 UF 20%, 20 VDCW V05307 184-7375-00 A5C16		1
	-122	1N458 . SEMICONDUCTOR DEVICE V03508 353-0205-00 A5CR37		1
	-123	RC07GF104K . RESISTOR, 100,000 OHMS 10%, 1/4 W V01121 745-0821-00 A5R4		1
	-124	RC07GF154K . RESISTOR, 150,000 OHMS 10%, 1/4 W V01121 745-0827-00 A5R16		1
	-125	1N459 . SEMICONDUCTOR DEVICE V03508 353-0206-00 A5CR1		1
	-125A	CM05F220J03 . CAPACITOR, 22 UHF 5%, 500 VDCW V53021 912-2768-00 A5C28 EFF MCN 665 SR-18		1
	-126	RC07GF153K . RESISTOR, 15,000 OHMS 10%, 1/4 W V01121 745-0791-00 A5R60		1
	-127	RC07GF103K . RESISTOR, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 A5R57		1
	-128	150D155X0035 . CAPACITOR, 1.5 UF 20%, 35 VDCW V56289 R2 184-7688-00 A5C30		1
	-129	RC07GF104K . RESISTOR, 100,000 OHMS 10%, 1/4 W V01121 745-0821-00 A5R58		1
	-130	RC07GF153K . RESISTOR, 15,000 OHMS 10%, 1/4 W V01121 745-0791-00 A5R61		1
	-131	1N458 . SEMICONDUCTOR DEVICE V03508 353-0205-00 A5CR29 EFF THRU MCN 256		1
	-131	1N270 . SEMICONDUCTOR DEVICE V03508 353-2018-00 A5CR29 EFF MCN 257		1
	-132	1N458 . SEMICONDUCTOR DEVICE V03508 353-0205-00 A5CR28		1



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FIG. -ITEM	PART NO.	NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
		1 2 3 4 5 6 7		
7	-133 151D114X0035 A2	• CAPACITOR, 110,000 UUF 20%, 35 VDCW V56289 184-8250-00 A5C22		1
	-134 MF1-8 14-7K1 PCT17	• RESISTOR, 14,700 OHMS 1%, 1/8 W V19701 705-0619-00 A5R56		1
	-135 RC07GF103K	• RESISTOR, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 A5R42		1
	-136 RC07GF273K	• RESISTOR, 27,000 OHMS 10%, 1/4 W V01121 745-0800-00 A5R30		1
	-137 150D684X0025 A2	• CAPACITOR, 680,000 UUF 20%, 35 VDCW V56289 184-7685-00 A5C21		1
	-138 1N459	• SEMICONDUCTOR DEVICE V03508 353-0206-00 A5CR6		1
	-139 RC07GF181K	• RESISTOR, 180 OHMS 10%, 1/4 W V01121 745-0722-00 A5R11		1
	-140 MF1-8 75K1PC TT7	• RESISTOR, 75,000 OHMS 1%, 1/8 W V19701 705-0616-00 A5R13		1
	-141 224L1-203	• RESISTOR, VAR, 20,000 OHMS 5%, 1/2 W VR0294 381-1289-00 A5R14		1
	554-2149-002	• ATTACHING PARTS SCREW, MACH.		2
	-142 1N459	• SEMICONDUCTOR DEVICE V03508 353-0206-00 A5CR7		1
	-143 RN60D2151F	• RESISTOR, 2150 OHMS 1%, 1/8 W V75042 705-6612-00 A5R15		1
	-144 CM06F182J03	• CAPACITOR, 1800 UUF 5%, 500 VDCW V53021 912-3010-00 A5C0		1
	-145 RC07GF472K	• RESISTOR, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 A5R88 EFF MCN 610 SB-22		1
	-146 224L1-502	• RESISTOR, VAR, 50,000 OHMS 5%, 1/2 W VR0294 381-1289-00 A5R78		1
	554-2149-002	• ATTACHING PARTS SCREW, MACH.		2
	-147 T1TM1-4 1-8K PORM10PCT	• RESISTOR, 1800 OHMS 10%, 1/4 W V06214 714-2366-00 A5R62		1
	-148 RC07GF683K	• RESISTOR, 68,000 OHMS 10%, 1/4 W V01121 745-0815-00 A5R72		1
	-149 RC07GF183K	• RESISTOR, 18,000 OHMS 10%, 1/4 W V01121 745-0794-00 A5R00		1
	-150 CL25RG100JUP3	• CAPACITOR, 10 UF +75-15%, 25 VDCW V56289 184-7225-00 A5C24		1
	-151 RC07GF392K	• RESISTOR, 3900 OHMS 10%, 1/4 W V01121 745-0770-00 A5R70		1
	-152 151D235X0035 B2	• CAPACITOR, 2.3 UF 20%, 35 VDCW V56289 184-8268-00 A5C27		1
	-153 RC07GF103K	• RESISTOR, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 A5R71		1
	-154 RC07GF103K	• RESISTOR, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 A5R69		1
	-155 1N270	• SEMICONDUCTOR DEVICE V03508 353-2018-00 A5CR24		1

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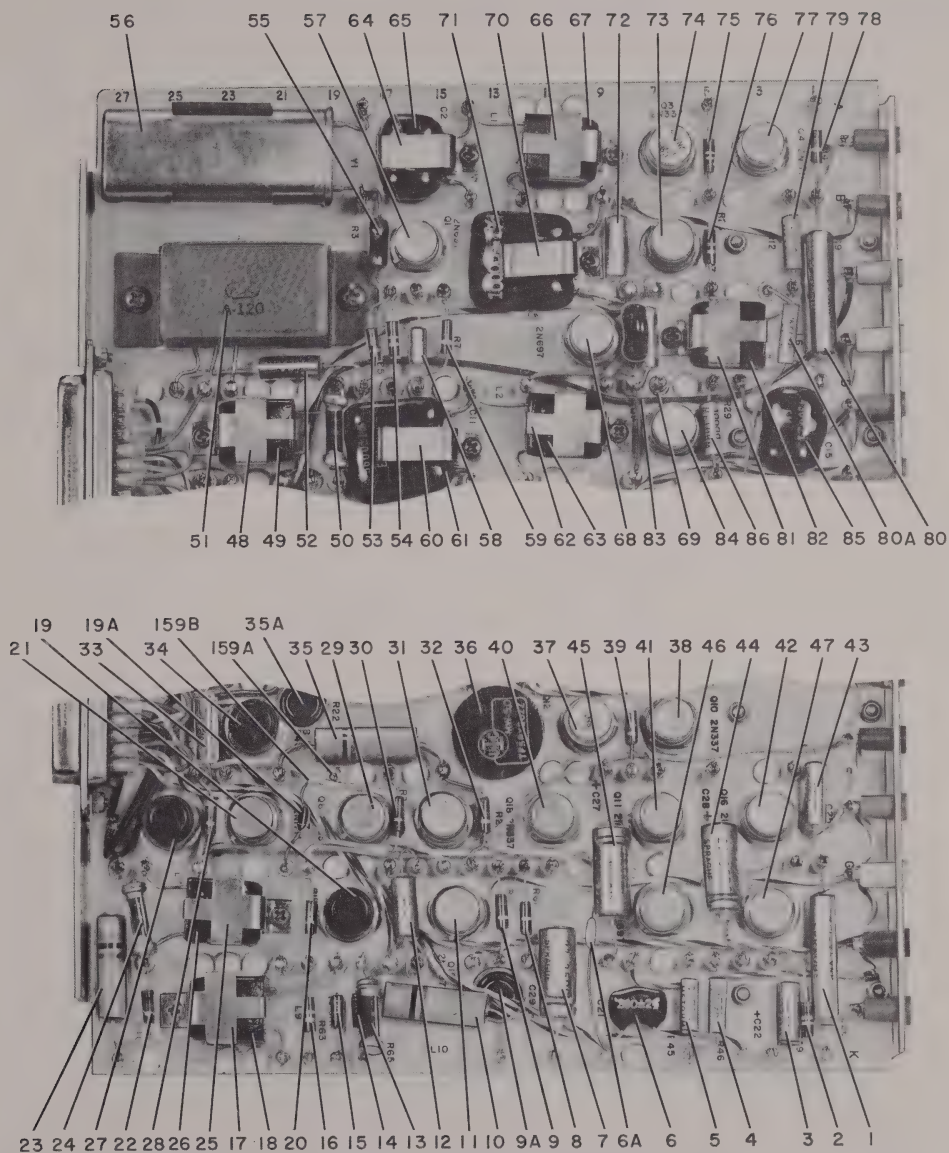
FIG. -ITEM	PART NO.	NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
		1 2 3 4 5 6 7		
7	-156 K1J35S	• CAPACITOR, 1 UF 20%, 35 VDCW V05397 184-7398-00 A5C31		1
	-157 CD19F332F03	• CAPACITOR, 3300 UHF 1%, 500 VDCW V14655 912-3038-00 A5C13		1
	-158 RC07GF222K	• RESISTOR, 2200 OHMS 10%, 1/4 W V01121 745-0761-00 A5R26		1
	-159 RC07GF474K	• RESISTOR, 470,000 OHMS 10%, 1/4 W V01121 745-0845-00 A5R46		1
	-160 RC07GF222K	• RESISTOR, 2200 OHMS 10%, 1/4 W V01121 745-0761-00 A5R23		1
	-161 RC07GF103K	• RESISTOR, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 A5R21		1
	-162 CM06F152J03	• CAPACITOR, 1500 UHF 5%, 500 VDCW V53021 912-3013-00 A5C14		1
	-163 1N458	• SEMICONDUCTOR DEVICE V03508 353-0205-00 A5CR10 EFF THRU MCN 369		1
	-163 1N270	• SEMICONDUCTOR DEVICE V03508 353-2018-00 A5CR10 EFF MCN 370		1
	-164 RC07GF183K	• RESISTOR, 18,000 OHMS 10%, 1/4 W V01121 745-0794-00 A5R7		1
	-165 RC07GF822K	• RESISTOR, 8200 OHMS 10%, 1/4 W V01121 745-0782-00 A5R10		1
	-166 RC07GF103K	• RESISTOR, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 A5R0		1
	-167	DELETED		
	-168 RC07GF824K	• RESISTOR, 820,000 OHMS 10%, 1/4 W V01121 745-0854-00 A5P5		1
	-169 1N458	• SEMICONDUCTOR DEVICE V03508 353-0205-00 A5CR2		1
	-170 RC07GF103K	• RESISTOR, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 A5R09		1
	-171 151D235X0035 R2	• CAPACITOR, 2.3 UF 20%, 35 VDCW V56289 184-8268-00 A5C6		1
	-172 RC07GF103K	• RESISTOR, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 A5P31		1
	-173 RC07GF273K	• RESISTOR, 27,000 OHMS 10%, 1/4 W V01121 745-0800-00 A5P45		1
	-174 151D235X0035 R2	• CAPACITOR, 2.3 UF 20%, 35 VDCW V56289 184-8268-00 A5C7		1
	-175 151D235X0035 R2	• CAPACITOR, 2.3 UF 20%, 35 VDCW V56289 184-8268-00 A5C24		1
	-176 1N751A	• SEMICONDUCTOR DEVICE, ZENER DIO, 5.1 V 5% V03508 353-2710-00 A5CR9		1
	-177 RC07GF822K	• RESISTOR, 8200 OHMS 10%, 1/4 W V01121 745-0782-00 A5P65		1
	-178 1N458	• SEMICONDUCTOR DEVICE V03508 353-0205-00 A5CR27 EFF THRU MCN 111		1
	-178 1N270	• SEMICONDUCTOR DEVICE V03508 353-2018-00 A5CR27 EFF MCN 112		1
	-179 RC07GF101K	• RESISTOR, 100 OHMS 10%, 1/4 W V01121 745-0713-00 A5R77		1
	-180 855-502X5V0 203Z	• CAPACITOR, 20,000 UUF +80-20%, 100 VDCW V72982 912-3678-00 A5C23		1
	-181 RC07GF332K	• RESISTOR, 3300 OHMS 10%, 1/4 W V01121 745-0767-00 A5R76		1
	-182 RC07GF472K	• RESISTOR, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 A5R75		1
	-183 RC07GF472K	• RESISTOR, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 A5R66		1



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DISTANCE INTERROGATION
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FIG. -ITEM	PART NO.	NOMENCLATURE										USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7					
7	-184	RC07GF392K	.	RESISTOR, 3900 OHMS 10%, 1/4 W	V01121								1
			.	745-0770-00	A5R86								
	-185	224L1-203	.	RESISTOR, VAR, 20,000 OHMS 5%, 1/2 W									1
			.	V80294 381-1280-00	A5R83								
			.	ATTACHING PARTS									
		554-2149-002	.	SCREW, WACH.									1
			.	- * - -									
	-186	554-2157-005	.	TERMINAL BOARD									1
	-187	SKT41GRN	.	JACK, TIP	V98291	360-0260-00	A5J6						1
	-188	SKT41GRN	.	JACK, TIP	V98291	360-0262-00	A5J5						1
	-189	SKT41YFL	.	JACK, TIP	V98291	360-0261-00	A5J4						1
	-190	SKT41GRN	.	JACK, TIP	V98291	360-0260-00	A5J3						1
	-191	SKT41RFD	.	JACK, TIP	V98291	360-0250-00	A5J2						1
	-192	SKT41BRN	.	JACK, TIP	V98291	360-0258-00	A5J1						1
	-193	SKT41BRN	.	JACK, TIP	V98291	360-0258-00	A5J11						1
	-194	SKT41BLK	.	JACK, TIP	V98291	360-0257-00	A5J10						1
	-195	SKT41WHT	.	JACK, TIP	V98291	360-0266-00	A5J9						1
	-196	SKT41GY	.	JACK, TIP	V98291	360-0265-00	A5J8						1
	-197	SKT41VIO	.	JACK, TIP	V98291	360-0264-00	A5J7						1
	-198	SL286-301D	.	TERMINAL, FEEDTHRU	V12615	306-1331-00							77
		WHT	.										
	-199	SL286-301D	.	TERMINAL, FEEDTHRU	V12615	306-1336-00							16
		YFL	.										
	-200	SL286-301D	.	TERMINAL, FEEDTHRU	V12615	306-1337-00							18
		GRN	.										
	-201	SL286-301D	.	TERMINAL, FEEDTHRU	V12615	306-1338-00							18
		RLU	.										
	-202	SL295-315	.	TERMINAL, STANDOFF	V12615	306-1264-00							35
	-203	SL275-197D	.	TERMINAL, FEEDTHRU	V12615	306-1521-00							6
		WHT	.										
	-204	SL295-315RLU	.	TERMINAL, FEEDTHRU	V12615	306-2267-00							2
	-205	SL295-315GRN	.	TERMINAL, FEEDTHRU	V12615	306-2266-00							2
	-206	F22NCFMA1-26	.	NUT, SELF-LKG, CLINCH	V72962								12
			.	333-0837-00									
	-207	100-200-5-0	.	CLIP, SPG TENS	V99378	139-0746-00							2
			.	ATTACHING PARTS									
		MS16535-52	.	RIVET	V12014	305-1731-00							4
			.	- * - -									
	-208	100-200-16-1	.	RETAINER, ELECTRON TUBE	V99378								2
			.	141-0339-00									
			.	ATTACHING PARTS									
		MS16535-52	.	RIVET	V12014	305-1731-00							4
			.	- * - -									
	-209	554-2148-002	.	BRACKET, ANGLE									2
			.	ATTACHING PARTS									
		MS16535-52	.	RIVET	V12014	305-1731-00							4
			.	- * - -									
	-210	554-2156-005	.	TERMINAL BOARD									1
	-211	05-3307-51	.	SOCKET, TSTR	V91662	352-9903-00							20
			.	A5XQ1 THRU A5XQ20									
	-212	554-2155-005	.	TERMINAL BOARD									1



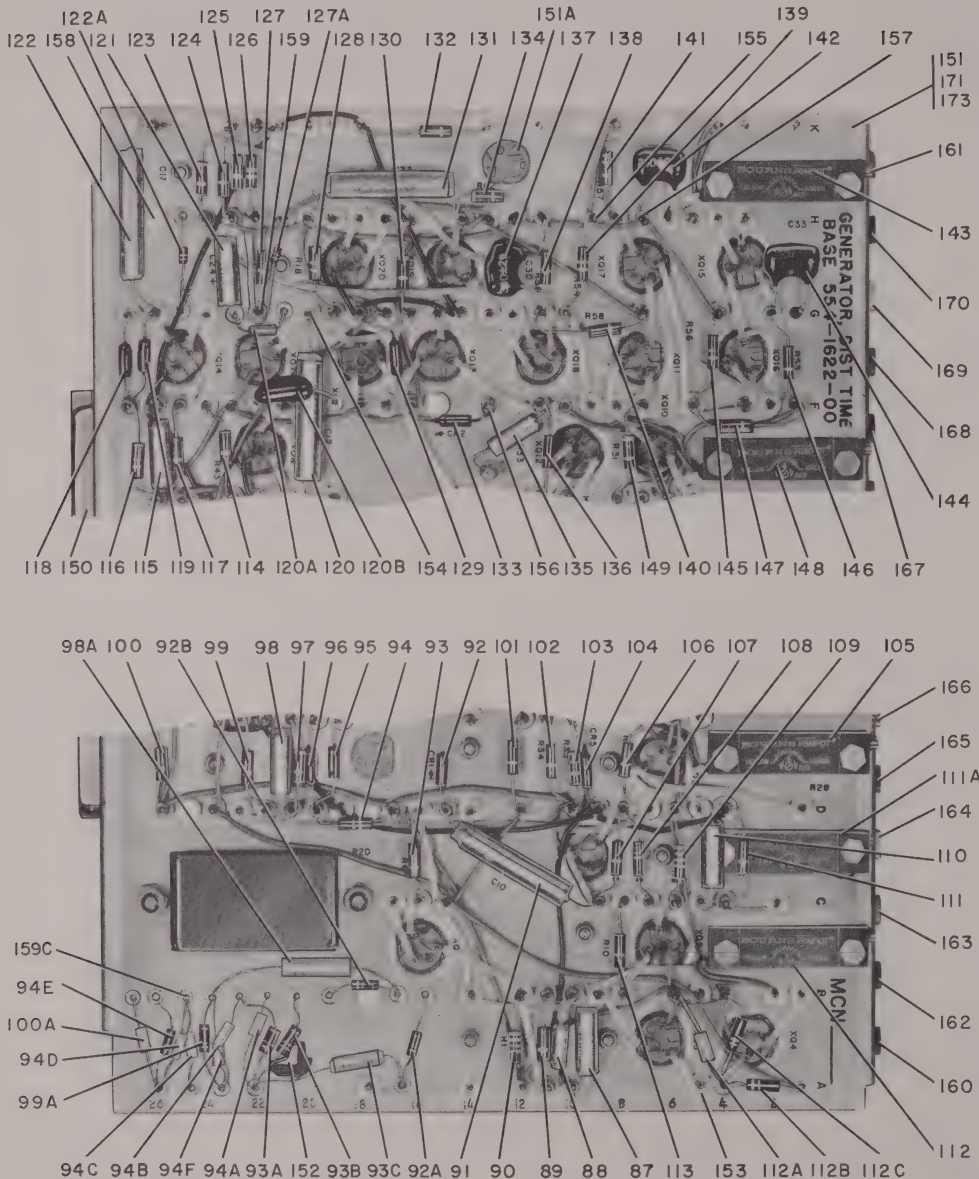
Distance Time Base Generator (Sheet 1 of 2)
Figure 8



ILLUSTRATED PARTS CATALOG

SECTION IV

DISTANCE TIME
BASE GENERATOR



Distance Time Base Generator (Sheet 2 of 2)

Figure 8



FIG. -ITEM	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.	
		1	2	3	4	5	6	7			
8	-	554-1622-00	DISTANCE TIME BASE GENERATOR A4 SEE FIG. 1-11 FOR NHA								REF
- 1	151D235X0035 B2	CAPACITOR, 2.3 UF 20%, 35 VDCW V56289								1	
- 2	RC07GF104K	RESISTOR, 100,000 OHMS 10%, 1/4 W V01121								1	
- 3	K3R3J35S	CAPACITOR, 3.3 UF 20%, 35 VDCW V05397								1	
- 4	MF1-8 61-9K1 PCT17	RESISTOR, 61,900 OHMS 1%, 1/8 W V19701								1	
- 5	MF1-8 95-3K1 PCT17	RESISTOR, 95,300 OHMS 1%, 1/8 W V19701								1	
- 6	CM05F391G03	CAPACITOR, 390 UUF 2%, 500 VDCW V53021								1	
- 6A	TI1M1-4 3900 -5PCT	RESISTOR, 3900 OHMS 5%, 1/4 W V96214								1	
- 7	150D226X0035 R2	CAPACITOR, 22 UF 20%, 35 VDCW V56289								1	
- 8	RC07GF122K	RESISTOR, 1200 OHMS 10%, 1/4 W V01121								1	
- 9	RC07GF562K	RESISTOR, 5600 OHMS 10%, 1/4 W V01121								1	
- 9A	2N1711	TRANSISTOR V96214 352-0400-00 A40201								1	
- 10	2500-62	COIL, 5000 UH V99800 240-2557-00 A4L10								1	
- 11	2N697	TRANSISTOR V96214 352-0197-00 A4019								1	
- 12	K3R3J35S	CAPACITOR, 3.3 UF 20%, 35 VDCW V05397								1	
- 13	763F84	RESISTOR, 1000 OHMS 10%, 1 W V10646								1	
- 14	1N458	SEMICONDUCTOR DEVICE V03508 353-0205-00								1	
- 15	1N458	SEMICONDUCTOR DEVICE V03508 353-0205-00								1	
- 16	RC07GF103K	RESISTOR, 10,000 OHMS 10%, 1/4 W V01121								1	
- 17	554-2164-003	CLIP, SPG TENS								1	
	MS35216-2	ATTACHING PARTS								1	
- 18	DL107	REACTOR, 700 MH V80223 668-0036-00 A4L7								1	
- 19	2N2048	TRANSISTOR V96214 352-0464-00 A4020								1	
- 19A	1N964B	SEMICONDUCTOR DEVICE, ZENER DIO, 13 V 5%								1	
- 20	RC07GF222K	RESISTOR, 2200 OHMS 10%, 1/4 W V01121								1	
- 21	2N1711	TRANSISTOR V96214 352-0400-00 A407								1	
- 22	RC07GF101K	RESISTOR, 100 OHMS 10%, 1/4 W V01121								1	
- 23	2500-62	COIL, 5000 UH V99800 240-2557-00 A4L8								1	
- 24	763F84	RESISTOR, 1000 OHMS 10%, 1 W V10646								1	
- 25	554-2164-003	CLIP, SPG TENS								1	
	MS35216-2	ATTACHING PARTS								1	
- 26	DL107	REACTOR, 700 MH V80223 668-0036-00 A4L9								1	
- 27	2N2048	TRANSISTOR V96214 352-0464-00 A4014								1	
- 28	RC07GF472K	RESISTOR, 4700 OHMS 10%, 1/4 W V01121								1	



ILLUSTRATED PARTS CATALOG

SECTION IV

DISTANCE TIME
BASE GENERATOR

FIG.-ITEM	PART NO.	NOMENCLATURE										USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7					
8	- 29	2N337	.	TRANSISTOR	V96214	352-0099-00	A406						1
	- 30	RC07GF272K	.	RESISTOR, 2700 OHMS 10%, 1/4 W	V01121								1
				745-0764-00	A4R37								
	- 31	2N697	.	TRANSISTOR	V96214	352-0197-00	A4013						1
	- 32	RC07GF101K	.	RESISTOR, 100 OHMS 10%, 1/4 W	V01121								1
				745-0713-00	A4R21								
	- 33	K3R3J35S	.	CAPACITOR, 3.3 UF 20%, 35 VDCW	V05397								1
				184-7404-00	A4C19								
	- 34	2N2048	.	TRANSISTOR	V96214	352-0464-00	A408						1
	- 35	2500-62	.	COIL, 5000 UH	V99800	240-2557-00	A4L5						1
	- 35A	2N1711	.	TRANSISTOR	V96214	352-0400-00	A40202						1
				FFF MCN 123									
	- 36	DL108	.	REACTOR, 5 HENRIES	V80223	668-0037-00							1
				A4L3									
				ATTACHING PARTS									
		554-2163-002	.	SUPPORT, CHOKE									1
				- * - -									
	- 37	2N404A	.	TRANSISTOR	V96214	352-0378-00	A4012						1
	- 38	2N337	.	TRANSISTOR	V96214	352-0099-00	A4010						1
	- 39	RC07GF104K	.	RESISTOR, 100,000 OHMS 10%, 1/4 W	V01121								1
				745-0821-00	A4R30								
	- 40	2N337	.	TRANSISTOR	V96214	352-0099-00	A4018						1
	- 41	2N1711	.	TRANSISTOR	V96214	352-0400-00	A4011						1
	- 42	2N697	.	TRANSISTOR	V96214	352-0197-00	A4016						1
	- 43	K3R3J35S	.	CAPACITOR, 3.3 UF 20%, 35 VDCW	V05397								1
				184-7404-00	A4C25								
	- 44	150D226X0035	.	CAPACITOR, 22 UF 20%, 35 VDCW	V56289								1
		R2		184-7695-00	A4C28								
	- 45	150D226X0035	.	CAPACITOR, 22 UF 20%, 35 VDCW	V56289								1
		R2		184-7695-00	A4C27								
	- 46	2N697	.	TRANSISTOR	V96214	352-0197-00	A4017						1
	- 47	2N1711	.	TRANSISTOR	V96214	352-0400-00	A4015						1
	- 48	554-2164-003	.	CLIP, SPG TFNS									1
				ATTACHING PARTS									
		MS35216-2	.	SCREW	V77250	343-0123-00							1
				- * - -									
	- 49	DL107	.	REACTOR, 700 MH	V80223	668-0036-00	A4L4						1
	- 50	763F84	.	RESISTOR, 1000 OHMS 10%, 1 W	V10646								1
				714-1720-00	A4R22								
	- 51	D10456	.	FILTER, BAND PASS	V70674	673-0969-00							1
				A4FL1									
				ATTACHING PARTS									
		MS20365D440A	.	NUT, SELF-LKG, HEX.	V72962	333-0347-00							2
		MS35216-12	.	SCREW	V77250	343-0133-00							2
				- * - -									
	- 52	K3R3J35S	.	CAPACITOR, 3.3 UF 20%, 35 VDCW	V05397								1
				184-7404-00	A4C5								
	- 53	RC07GF101K	.	RESISTOR, 100 OHMS 10%, 1/4 W	V01121								1
				745-0713-00	A4R5								
	- 54	RC07GF103K	.	RESISTOR, 10,000 OHMS 10%, 1/4 W	V01121								1
				745-0785-00	A4R4								
	- 55	RN60D5112F	.	RESISTOR, 51,100 OHMS 1%, 1/8 W	V75042								1
				705-6678-00	A4R3								
	- 56	JKJH17T82	.	CRYSTAL UNIT, 017	V75378	289-5541-00							1
				A4Y1									
	- 57	2N697	.	TRANSISTOR	V96214	352-0197-00	A401						1
	- 58	K1J35S	.	CAPACITOR, 1 UF 20%, 35 VDCW	V05397								1
				184-7398-00	A4C4								
	- 59	RC07GF101K	.	RESISTOR, 100 OHMS 10%, 1/4 W	V01121								1
				745-0713-00	A4R7								

SECTION IV

DISTANCE TIME
BASE GENERATORILLUSTRATED PARTS
CATALOG

FIG. -ITEM	PART NO.	NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
		1 2 3 4 5 6 7		
8	- 60 554-2150-002	• RETAINER, CAPACITOR		1
	- 61 DM30F562F03	• CAPACITOR, 5600 UHF 1%, 500 VDCW V72136 912-3062-00 A4C11 ATTACHING PARTS FOR 60 AND 61		1
	MS35216-2	• SCREW V77250 343-0123-00 - - * - -		1
- 62	554-2164-003	• CLIP, SPG TENS		1
- 63	DL107	• REACTOR, 700 MH V80223 668-0036-00 A4L2 ATTACHING PARTS FOR 62 AND 63		1
	MS35216-2	• SCREW V77250 343-0123-00 - - * - -		1
- 64	554-2150-002	• RETAINER, CAPACITOR		1
- 65	CD19F472F03	• CAPACITOR, 4700 UHF 1%, 500 VDCW V14655 912-3050-00 A4C2 ATTACHING PARTS FOR 64 AND 65		1
	MS35216-2	• SCREW V77250 343-0123-00 - - * - -		1
- 66	554-2164-003	• CLIP, SPG TENS		1
- 67	DL644	• REACTOR, 400 MH V80223 668-0035-00 A4L1 ATTACHING PARTS		1
	MS35216-2	• SCREW V77250 343-0123-00 - - * - -		1
- 68	2N697	• TRANSISTOR V96214 352-0197-00 A405		1
- 69	CM05F221J03	• CAPACITOR, 220 UHF 5%, 500 VDCW V53021 912-2840-00 A4C34		1
- 70	554-2150-002	• RETAINER, CAPACITOR		1
- 71	DM30F103F03	• CAPACITOR, 10,000 UHF 1%, 500 VDCW V72136 912-3068-00 A4C8 ATTACHING PARTS FOR 70 AND 71		1
	MS35216-2	• SCREW V77250 343-0123-00 - - * - -		1
- 72	150D155X0035 R2	• CAPACITOR, 1.5 UF 20%, 35 VDCW V56289 184-7688-00 A4C7		1
- 73	2N697	• TRANSISTOR V96214 352-0197-00 A4Q2		1
- 74	2N337	• TRANSISTOR V96214 352-0099-00 A4Q3		1
- 75	RC07GF104K	• RESISTOR, 100,000 OHMS 10%, 1/4 W V01121 745-0821-00 A4R13		1
- 76	RC07GF103K	• RESISTOR, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 A4R26		1
- 77	2N1711	• TRANSISTOR V96214 352-0400-00 A4Q4		1
- 78	RC07GF222K	• RESISTOR, 2200 OHMS 10%, 1/4 W V01121 745-0761-00 A4R14		1
- 79	MF1-8 5-11K1 PCTT7	• RESISTOR, 5110 OHMS 1%, 1/8 W V19701 705-0611-00 A4R12		1
- 80	151D235X0035 R2	• CAPACITOR, 2.3 UF 20%, 35 VDCW V56289 184-8268-00 A4C9		1
- 80A	150D476X0020 R2	• CAPACITOR, 47 UF 20%, 20 VDCW V56289 184-7664-00 A4C202 FFF MCN 123		1
- 81	554-2164-003	• CLIP, SPG TENS		1
- 82	DL107	• REACTOR, 700 MH V80223 668-0036-00 A4L6 ATTACHING PARTS		1
	MS35216-2	• SCREW V77250 343-0123-00 - - * - -		1
- 83	K3R3J35S	• CAPACITOR, 3.3 UF 20%, 35 VDCW V05397 184-7404-00 A4C6		1
- 84	2N697	• TRANSISTOR V96214 352-0197-00 A4Q9		1
- 85	CD19F432F03	• CAPACITOR, 4300 UHF 1%, 500 VDCW V14655 912-3047-00 A4C15		1
- 86	MF1-8 1K1PCT T7	• RESISTOR, 1000 OHMS 1%, 1/8 W V19701 705-0613-00 A4R29		1
- 87	K3R3J35S	• CAPACITOR, 3.3 UF 20%, 35 VDCW V05397 184-7404-00 A4C3		1



ILLUSTRATED PARTS CATALOG

SECTION IV
DISTANCE TIME
BASE GENERATOR

FIG. -ITEM	PART NO.	NOMENCLATURE						USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6		
B	- 88	150D273X0035 A2	•	CAPACITOR, 27,000 UUF 10%, 35 VDCW	V56289				1
	- 89	RC07GF822K	•	RESISTOR, 8200 OHMS 10%, 1/4 W	V01121				1
	- 90	RC07GF393K	•	RESISTOR, 39,000 OHMS 10%, 1/4 W	V01121				1
	- 91	151D235X0035 B2	•	CAPACITOR, 2.3 UF 20%, 35 VDCW	V56289				1
	- 92	1N458	•	SEMICONDUCTOR DEVICE	V03508 353-0205-00				1
	- 92A	RC07GF222K	•	RESISTOR, 2200 OHMS 10%, 1/4 W	V01121				1
	- 92B	RC07GF224K	•	RESISTOR, 220,000 OHMS 10%, 1/4 W	V01121				1
	- 93	RC07GF272K	•	RESISTOR, 2700 OHMS 10%, 1/4 W	V01121				1
	- 93A	RC07GF272K	•	RESISTOR, 2700 OHMS 10%, 1/4 W	V01121				1
	- 93B	RC07GF103K	•	RESISTOR, 10,000 OHMS 10%, 1/4 W	V01121				1
	- 93C	151D505X0020 B2	•	CAPACITOR, 5 UF 20%, 20 VDCW	V56289				1
	- 94	RC07GF103K	•	RESISTOR, 10,000 OHMS 10%, 1/4 W	V01121				1
	- 94A	1N458	•	SEMICONDUCTOR DEVICE	V03508 353-0205-00				1
	- 94B	1N458	•	SEMICONDUCTOR DEVICE	V03508 353-0205-00				1
	- 94C	1N458	•	SEMICONDUCTOR DEVICE	V03508 353-0205-00				1
	- 94D	1N458	•	SEMICONDUCTOR DEVICE	V03508 353-0205-00				1
	- 94F	RC07GF393K	•	RESISTOR, 39,000 OHMS 10%, 1/4 W	V01121				1
	- 94F	1N967B	•	SEMICONDUCTOR DEVICE, ZENER DIO, 18 V 5%	V03508 353-3178-00 A4CR205 EFF				1
	- 95	1N458	•	SEMICONDUCTOR DEVICE	V03508 353-0205-00				1
	- 96	1N458	•	SEMICONDUCTOR DEVICE	V03508 353-0205-00				1
	- 97	RC07GF472K	•	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121				1
	- 98	K3R3J35S	•	CAPACITOR, 3.3 UF 20%, 35 VDCW	V05397				1
	- 98A	K4R7J35S	•	CAPACITOR, 4.7 UF 20%, 35 VDCW	V05397				1
	- 99	RC07GF101K	•	RESISTOR, 100 OHMS 10%, 1/4 W	V01121				1
	- 99A	RC07GF273K	•	RESISTOR, 27,000 OHMS 10%, 1/4 W	V01121				1
	-100	RC07GF101K	•	RESISTOR, 100 OHMS 10%, 1/4 W	V01121				1
	-100A	1N966B	•	SEMICONDUCTOR DEVICE, ZENER DIO, 16 V 5%	V03508 353-3177-00 A4CR206 EFF				1
	-101	RC07GF822K	•	RESISTOR, 8200 OHMS 10%, 1/4 W	V01121				1
	-102	RC07GF222K	•	RESISTOR, 2200 OHMS 10%, 1/4 W	V01121				1
	-103	RC07GF331K	•	RESISTOR, 330 OHMS 10%, 1/4 W	V01121				1

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DISTANCE TIME
BASE GENERATORILLUSTRATED PARTS
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FIG. -ITEM	PART NO.	NOMENCLATURE	USAGE CODE	UNITS				
				PER ASSY.				
1	2	3	4	5	6	7		
8	-104	1N756A	. SEMICONDUCTOR DEVICE, ZENER DIO, 8.2 V 5% V03508 353-2720-00 A4CR5					1
	-105	224L1-502	. RESISTOR, VAR, 5000 OHMS 5%, 1/2 W V80294 381-1287-00 A4R28					1
		554-2149-002	. SCREW, MACH. - - * - -					2
	-106	RC07GF222K	. RESISTOR, 2200 OHMS 10%, 1/4 W V01121 745-0761-00 A4R27					1
	-107	RC07GF222K	. RESISTOR, 2200 OHMS 10%, 1/4 W V01121 745-0761-00 A4R15					1
	-108	RC07GF683K	. RESISTOR, 68,000 OHMS 10%, 1/4 W V01121 745-0815-00 A4R8					1
	-109	RC07GF333K	. RESISTOR, 33,000 OHMS 10%, 1/4 W V01121 745-0803-00 A4R9					1
	-110	K22J15S	. CAPACITOR, 22 UF 20%, 15 VDCW V05397 184-7373-00 A4C14					1
	-111	RC07GF102K	. RESISTOR, 1000 OHMS 10%, 1/4 W V01121 745-0749-00 A4R25					1
	-111A	224L1-502	. RESISTOR, VAR, 5000 OHMS 5%, 1/2 W V80294 381-1287-00 A4R204 EFF MCN 123					1
		554-2149-002	. SCREW, MACH. - - * - -					2
	-112	224L1-103	. RESISTOR, VAR, 10,000 OHMS 5%, 1/2 W V80294 381-1288-00 A4R11					1
		554-2149-002	. SCREW, MACH. - - * - -					2
	-112A	1N458	. SEMICONDUCTOR DEVICE V03508 353-0205-00 A4CR207 EFF MCN 161					1
	-112B	RC07GF183K	. RESISTOR, 18,000 OHMS 10%, 1/4 W V01121 745-0794-00 A4R210 EFF MCN 161					1
	-112C	RC07GF183K	. RESISTOR, 18,000 OHMS 10%, 1/4 W V01121 745-0794-00 A4R211					1
	-113	RC07GF222K	. RESISTOR, 2200 OHMS 10%, 1/4 W V01121 745-0761-00 A4R10					1
	-114	RC07GF101K	. RESISTOR, 100 OHMS 10%, 1/4 W V01121 745-0713-00 A4R43					1
	-115	K3R3J35S	. CAPACITOR, 3.3 UF 20%, 35 VDCW V05397 184-7404-00 A4C18					1
	-116	RC07GF103K	. RESISTOR, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 A4R38					1
	-117	RC07GF101K	. RESISTOR, 100 OHMS 10%, 1/4 W V01121 745-0713-00 A4R36					1
	-118	1N458	. SEMICONDUCTOR DEVICE V03508 353-0205-00 A4CR8					1
	-119	1N458	. SEMICONDUCTOR DEVICE V03508 353-0205-00 A4CR7					1
	-120	151D235X0035 B2	. CAPACITOR, 2.3 UF 20%, 35 VDCW V56289 184-8268-00 A4C12					1
	-120A	1N458	. SEMICONDUCTOR DEVICE V03508 353-0205-00 A4CR12 EFF MCN 112					1
	-120B	CM05F101J03	. CAPACITOR, 100 UHF 5%, 500 VDCW V53021 912-2816-00 A4C204 EFF MCN 161					1
	-121	K3R3J35S	. CAPACITOR, 3.3 UF 20%, 35 VDCW V05397 184-7404-00 A4C24					1
	-122	151D235X0035 B2	. CAPACITOR, 2.3 UF 20%, 35 VDCW V56289 184-8268-00 A4C17					1



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DISTANCE TIME
BASE GENERATOR

FIG.-ITEM	PART NO.	NOMENCLATURE	USAGE							UNITS PER ASSY.
			1	2	3	4	5	6	7	
8.	-122A	RC07GF393K	.	RESISTOR, 39,000 OHMS 10%, 1/4 W	V01121					1
		745-0806-00 A4R208 EFF MCN 123								
	-123	RC07GF472K	.	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121					1
		745-0773-00 A4R51								
	-124	RC07GF182K	.	RESISTOR, 1800 OHMS 10%, 1/4 W	V01121					1
		745-0758-00 A4R52								
	-125	RC07GF222K	.	RESISTOR, 2200 OHMS 10%, 1/4 W	V01121					1
		745-0761-00 A4R50								
	-126	RC07GF153K	.	RESISTOR, 15,000 OHMS 10%, 1/4 W	V01121					1
		745-0791-00 A4R48								
	-127	RC07GF222K	.	RESISTOR, 2200 OHMS 10%, 1/4 W	V01121					1
		745-0761-00 A4R47								
	-127A	RC20GF332K	.	RESISTOR, 3300 OHMS 10%, 1/2 W	V01121					1
		745-1373-00 A4R67 EFF MCN 112								
	-128	RC07GF104K	.	RESISTOR, 100,000 OHMS 10%, 1/4 W	V01121					1
		745-0821-00 A4R18								
	-129	1N746A	.	SEMICONDUCTOR DEVICE, ZENER DIO, 3.3 V 5%						1
		V03508 353-2938-00 A4CR6								
	-130	RC07GF472K	.	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121					1
		745-0773-00 A4R66								
	-131	151D235X0035 R2	.	CAPACITOR, 2.3 UF 20%, 35 VDCW	V56289					1
		184-8268-00 A4C32								
	-132	RC07GF101K	.	RESISTOR, 100 OHMS 10%, 1/4 W	V01121					1
		745-0713-00 A4R64								
	-133	1N756A	.	SEMICONDUCTOR DEVICE, ZENER DIO, 8.2 V 5%						1
		V03508 353-2720-00 A4CR2								
	-134	RC07GF472K	.	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121					1
		745-0773-00 A4R62								
	-135	MF1-8 8-75K1 PCTT7	.	RESISTOR, 8750 OHMS 1%, 1/8 W	V19701					1
		705-0612-00 A4R16								
	-136	RC07GF152K	.	RESISTOR, 1500 OHMS 10%, 1/4 W	V01121					1
		745-0755-00 A4R33								
	-137	CM05F391G03	.	CAPACITOR, 390 UUF 2%, 500 VDCW	V53021					1
		912-2857-00 A4C30								
	-138	RC07GF102K	.	RESISTOR, 1000 OHMS 10%, 1/4 W	V01121					1
		745-0749-00 A4R59								
	-139	RC07GF103K	.	RESISTOR, 10,000 OHMS 10%, 1/4 W	V01121					1
		745-0785-00 A4R54								
	-140	RC07GF822K	.	RESISTOR, 8200 OHMS 10%, 1/4 W	V01121					1
		745-0782-00 A4R58								
	-141	RC07GF392K	.	RESISTOR, 3900 OHMS 10%, 1/4 W	V01121					1
		745-0770-00 A4R57								
	-142	CM05F391G03	.	CAPACITOR, 390 UUF 2%, 500 VDCW	V53021					1
		912-2857-00 A4C23								
	-143	224L1-103	.	RESISTOR, VAR, 10,000 OHMS 5%, 1/2 W						1
		V80294 381-1288-00 A4R44								
		ATTACHING PARTS								
		MS35649-24	.	NUT V77250 313-0037-00						1
		MS35337-77	.	WASHER V79807 310-0070-00						1
		4040-2HOT	.	TERMINAL, LUG V77147 304-0014-00						1
		TINNED								
		554-2149-002	.	SCREW, MACH.						2
				- - * - -						
	-144	CM05F221J03	.	CAPACITOR, 220 UUF 5%, 500 VDCW	V53021					1
				912-2840-00 A4C33						
	-145	RC07GF103K	.	RESISTOR, 10,000 OHMS 10%, 1/4 W	V01121					1
				745-0785-00 A4R56						
	-146	RC07GF682K	.	RESISTOR, 6800 OHMS 10%, 1/4 W	V01121					1
				745-0779-00 A4R53						
	-147	RC07GF682K	.	RESISTOR, 6800 OHMS 10%, 1/4 W	V01121					1
				745-0779-00 A4R55						

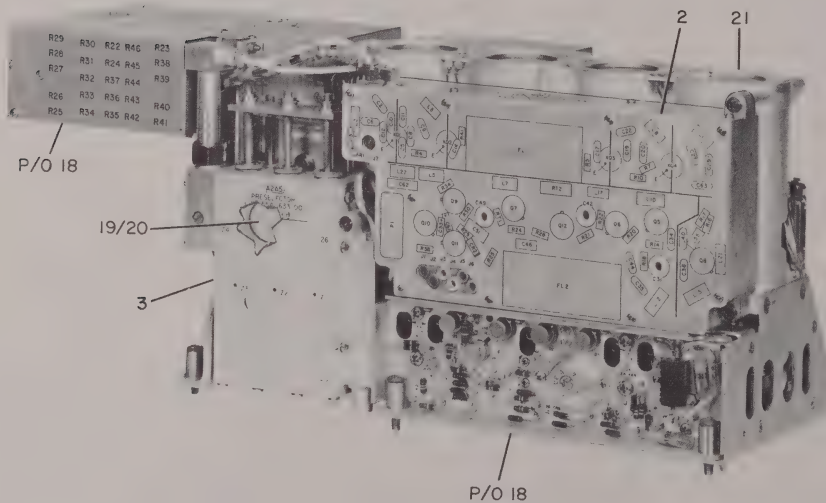
SECTION IV

DISTANCE TIME
BASE GENERATORILLUSTRATED PARTS
CATALOG

FIG. -ITEM	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.	
		1	2	3	4	5	6	7			
B	-148	224L1-502	. RESISTOR, VAR, 5000 OHMS 5%, 1/2 W V80294 381-1287-00 A4R17 ATTACHING PARTS								1
		554-2149-002	. SCREW, MACH. - - * - -								2
	-149	RC07GF472K	. RESISTOR, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 A4R31								1
	-150	DB25PC7	. CONNECTOR, RECP V91146 371-0170-00 A4P1 ATTACHING PARTS								1
		68NM26	. NUT, SELF-LKG, HFY. V72962 333-0327-00 EFF THRU MCN 111								2
		68-1660-26	. NUT, SELF-LKG, HFY. V72962 333-0604-00 EFF MCN 112								1
		4040-2H0T TINNED	. TERMINAL, LUG V77147 304-0014-00								1
		MS35200-3	. SCREW V77250 342-0133-00 - - * - -								2
	-151	554-2169-005	. TERMINAL BOARD								1
	-151A	195-207	. . SOCKET, TSTR V12615 352-9995-00 A4XQ201, A4XQ202 EFF MCN 123								2
	-152	100-206-2	. . CLIP, SPG TENS V99378 139-2370-00 ATTACHING PARTS								1
		MS16535-52	. . RIVET V12014 305-1731-00 EFF THRU MCN 122								2
		MS16535-55	. . RIVET V12014 305-0147-00 EFF MCN 123								2
		553-5107-003	. . WASHER EFF MCN 123 - - * - -								2
	-153	SL286-301D GRN	. . TERMINAL, FEEDTHRU V12615 306-1337-00								21
	-154	SL286-301D YEL	. . TERMINAL, FEEDTHRU V12615 306-1336-00								18
	-155	SL286-301D WHT	. . TERMINAL, FEEDTHRU V12615 306-1331-00								61
	-156	SL300-314D	. . TERMINAL, STANDOFF V12615 306-1820-00								2
	-157	SL295-315	. . TERMINAL, STANDOFF V12615 306-1264-00								45
	-158	SL275-197D WHT	. . TERMINAL, FEEDTHRU V12615 306-1521-00								10
	-159	SL286-301D BLU	. . TERMINAL, FEEDTHRU V12615 306-1338-00								16
	-159A	SL295-315YEL	. . TERMINAL, FEEDTHRU V12615 306-2265-00 EFF MCN 122								1
	-159B	SL295-315BLU	. . TERMINAL, FEEDTHRU V12615 306-2267-00 EFF MCN 122								1
	-159C	SL295-315GRN	. . TERMINAL, FEEDTHRU V12615 306-2266-00 EFF MCN 123								1
	-160	SKT41BRN	. . JACK, TIP V98291 360-0258-00 A4J1								1
	-161	SKT41BRN	. . JACK, TIP V98291 360-0258-00 A4J11								1
	-162	SKT41RED	. . JACK, TIP V98291 360-0250-00 A4J2								1
	-163	SKT41ORN	. . JACK, TIP V98291 360-0260-00 A4J3								1
	-164	SKT41YEL	. . JACK, TIP V98291 360-0261-00 A4J4								1
	-165	SKT41GRN	. . JACK, TIP V98291 360-0262-00 A4J5								1
	-166	SKT41BLU	. . JACK, TIP V98291 360-0263-00 A4J6								1
	-167	SKT41VIO	. . JACK, TIP V98291 360-0264-00 A4J7								1
	-168	SKT41GY	. . JACK, TIP V98291 360-0265-00 A4J8								1
	-169	SKT41WHT	. . JACK, TIP V98291 360-0266-00 A4J9								1
	-170	SKT41BLK	. . JACK, TIP V98291 360-0257-00 A4J10								1
	-171	554-2168-00	. . TERMINAL BOARD								1
	-172	05-3307-51	. . . SOCKET, TSTR V91662 352-9903-00 A4XQ1 THRU A4XQ20								20
	-173	554-2167-005	. . . TERMINAL BOARD								1



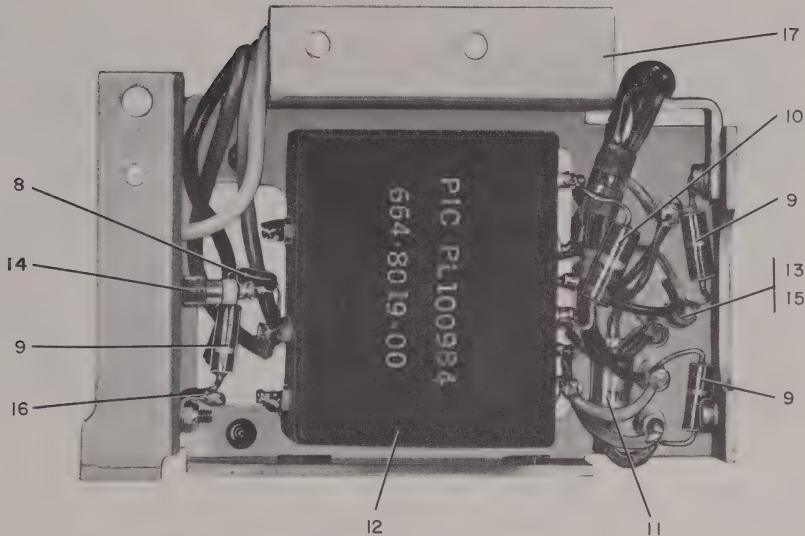
A black and white photograph of the internal components of a vacuum tube electronic device, likely a radio receiver. The image shows a metal chassis with various electronic components mounted on it. A large vacuum tube is visible in the center. The chassis is labeled with "DANGER HIGH VOLTAGE" and "T1". The components are labeled with numbers 1 through 7, which correspond to the labels in the caption.



Radio Receiver-Transmitter (Sheet 1 of 2)
Figure 9



ILLUSTRATED PARTS
CATALOG



Radio Receiver-Transmitter (Sheet 2 of 2)
Figure 9

FIG.-ITEM		PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
			1	2	3	4	5	6	7		
9	-	554-1627-00	RADIO RECEIVER-TRANSMITTER A2 SEE FIG. 1-12 FOR NHA								REF
	- 1	554-1629-00	• PULSE MODULATOR A2A4 SEE FIG. 10								1
	- 2	554-1631-00	• I-F AMPLIFIER A2A6 SEE FIG. 11								1
	- 3	554-1633-00	• PRESELECTOR A2A5 SEE FIG. 12								1
	- 4	554-1630-00	• FREQUENCY MULTIPLIER AMPLIFIER A2A2 SEE FIG. 13								1
	- 5	554-2251-00	• COUPLING HALF, SHAFT								1
	- 6	554-1656-002	• COLLAR, SHAFT								1
		MS51053-426	• SETSCREW V08664 335-0003-00 - - * - -								2
		NO NUMBER	• TRANSFORMER ASSY								1
		MS35200-11	• SCREW V77250 342-0043-00								3
		MS35200-12	• SCREW V77250 342-0044-00								1



ILLUSTRATED PARTS CATALOG

SECTION IV
RADIO RECEIVER-
TRANSMITTER

FIG. -ITEM	PART NO.	NOMENCLATURE						USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6		
9	MS35200-13	•	SCREW	V77250	342-0045-00				1
	MS35216-23	•	SCREW	V77250	343-0167-00				1
	MS35338-79	•	WASHER	V79807	310-0282-00				1
	MS35216-12	•	SCREWF	V77250	343-0133-00				2
	MS35338-78	•	WASHER	V79807	310-0279-00				2
		-	-	*	-	-			
- 7	554-2085-002	•	PLATE, COVER						1
	COML	•	ATTACHING PARTS						
		•	SCREW	330-2284-00					2
		-	-	*	-	-			
- 8	1N3284	•	SEMICONDUCTOR DEVICE	V03508					1
				353-3356-00	A2CR12				
- 9	RC20GF101K	•	RESISTOR, 100 OHMS 10%, 1/2 W	V01121					3
				745-1310-00	A2R10, A2R11, A2R14				
- 10	RC42GF100K	•	RESISTOR, 10 OHMS 10%, 2 W	V01121					1
				745-5568-00	A2R13				
- 11	1N2610	•	SEMICONDUCTOR DEVICE	V03508					1
				353-1905-00	A2CR11				
- 12	PL100984	•	TRANSFORMER, PULSE	V98330	664-8019-00				1
				A2T1					
		•	ATTACHING PARTS						
	MS35200-11	•	SCREW	V77250	342-0043-00				4
		-	-	*	-	-			
- 13	G4777-10	•	TERMINAL, STUD	V12615	306-1018-00				5
- 14	AB396-1	•	TERMINAL, STUD	V12615	306-1281-00				1
- 15	4040-2HOT TINNED	•	TERMINAL, LUG	V77147	304-0014-00				2
			ATTACHING PARTS FOR 13 THRU 15						
	MS35216-12	•	SCREWF	V77250	343-0133-00				6
	MS35338-77	•	WASHER	V79807	310-0275-00				6
		-	-	*	-	-			
- 16	4040-2HOT TINNED	•	TERMINAL, LUG	V77147	304-0014-00				1
			ATTACHING PARTS						
	COML	•	SCREW	343-0299-00					1
	68-1660-26	•	NUT, SELF-LKG, HFX.	V72962	333-0604-00				1
		-	-	*	-	-			
- 17	554-2088-004	•	RETAINER, XMER						1
- 18	554-1632-00	•	CHANNEL SELECTOR	A2A1	SEE FIG. 14				1
			ATTACHING PARTS						
	MS35200-23	•	SCREW	V77250	342-0060-00				2
	MS35200-12	•	SCREW	V77250	342-0044-00				4
	COML	•	SCREW	342-0273-00					1
	MS35216-23	•	SCREW	V77250	343-0167-00				4
	MS35338-79	•	WASHER	V79807	310-0282-00				4
		-	-	*	-	-			
- 19	554-2252-003	•	COUPLING HALF, SHAFT						1
- 20	554-1656-002	•	COLLAR, SHAFT						1
			ATTACHING PARTS FOR 19 AND 20						
	MS51053-426	•	SETSCREW	V08664	335-0003-00				2
		-	-	*	-	-			
- 21	554-1628-00	•	R-F AMPLIFIER	A2A3	SEE FIG. 18				1

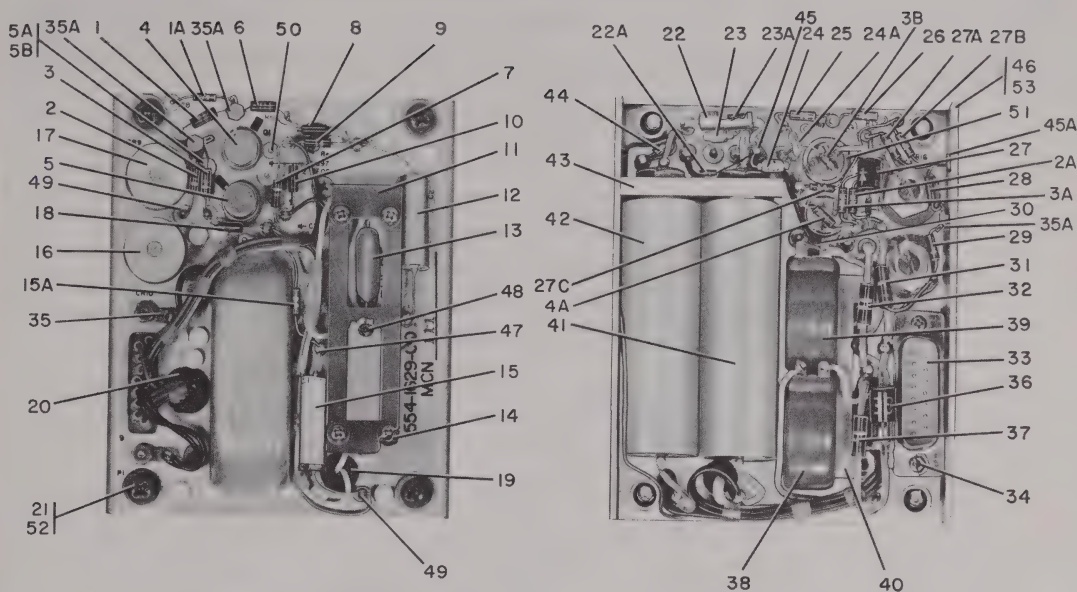
Pulse Modulator
Figure 10

FIG. -ITEM	PART NO.	NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
		1 2 3 4 5 6 7		
10 -	554-1629-00	PULSE MODULATOR A2A4 SEE FIG. 9-1 FOR NHA		REF
R - 1	RC07GF103K	• RESISTOR, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 A2A4R8 EFF THRU MCN 3287		1
R - 1	RC07GF102K	• RESISTOR, FXD, 1000 OHMS 10%, 16 VDCW 745-0749-000 A2A4R8 EFF MCN 3288 SB-28		1
- 1A	1N458	• SEMICONDUCTOR DEVICE V03508 353-0205-00 A2A4CR14 EFF MCN 1346 SB-25		1
- 2	RC07GF103K	• RESISTOR, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 A2A4R9 EFF THRU MCN 1345		1
R - 2A	RC07GF103K	• RESISTOR, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 A2A4R9 EFF MCN 1346 THRU MCN 3287 SB-25		1
R - 2A	RC07GF102K	• RESISTOR, FXD, 1000 OHMS 10%, 16 VDCW 745-0749-000 A2A4R9 EFF MCN 3288 SB-28		1
- 3	RC07GF223K	• RESISTOR, 22,000 OHMS 10%, 1/4 W V01121 745-0797-00 A2A4R7 EFF THRU MCN 1345		1
- 3A	RC07GF223K	• RESISTOR, 22,000 OHMS 10%, 1/4 W V01121 745-0797-00 A2A4R7 EFF MCN 1346 SB-25		1
R - 3B	RC07GF152K	• RESISTOR, FXD, 1500 OHMS 10%, 19 VDCW 745-0755-000 A2A4R24 EFF MCN 3288 SB-28		1
- 4	2N697	• TRANSISTOR V96214 352-0197-00 A2A4Q1		1
R - 4A	RC07GF152K	• RESISTOR, FXD, 1500 OHMS 10%, 19 VDCW 745-0755-000 A2A4R25 EFF MCN 3288 SB-28		1
- 5	2N697	• TRANSISTOR V96214 352-0197-00 A2A4Q2		1
- 5A	2N706	• TRANSISTOR V96214 352-0195-00 A2A4Q3 EFF MCN 1346 SB-25		1



ILLUSTRATED PARTS CATALOG

SECTION IV PULSE MODULATOR

FIG. & INDEX NO.	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
10	- 5B T389	•	HOLDER, TSTR	V05982	352-9509-00	EFF				1
	- 6 RC07GF223K	•	MCN 1346 SB-25							
	- 7 RC07GF223K	•	RESISTOR, 22,000 OHMS	10%, 1/4 W	V01121					1
	- 7 RC07GF563K	•	745-0797-00 A2A4R6							
	- 8 1N458	•	RESISTOR, 22,000 OHMS	10%, 1/4 W	V01121					1
	- 9 RC07GF223K	•	745-0797-00 A2A4R5	EFF THRU MCN 111						
	- 9 RC07GF563K	•	RESISTOR, 56,000 OHMS	10%, 1/4 W	V01121					1
	- 10 1N458	•	745-0812-00 A2A4R5	EFF MCN 112						
	- 11 554-2183-003	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00					1
	MS35216-2	•	A2A4CR7							
	MS35338-77	•	RESISTOR, 22,000 OHMS	10%, 1/4 W	V01121					1
	COML	•	745-0797-00 A2A4R4	EFF THRU MCN 111						
	- 12 118P10302S4	•	RESISTOR, 56,000 OHMS	10%, 1/4 W	V01121					1
	- 13 RW69V1R0	•	745-0812-00 A2A4R4	EFF MCN 112						
	- 13 RW69V2R2	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00					1
	- 13 RS2C3R100J	•	A2A4CR6							
	- 14 540-9002-003	•	INSULATOR, PLATE							1
	MS35200-2	•	ATTACHING PARTS							
	- 15 118P10302S4	•	SCRFW V77250	343-0123-00						4
	- 15A RC07GF471K	•	WASHER V79807	310-0275-00						4
	- 16 W301A	•	WASHER 310-0044-00							4
	- 17 W301A	•	CAPACITOR, 100,000 UUF	20%, 200 VDCW						1
	- 18 1N458	•	V56289 951-1030-00	A2A4C2						
	- 19 3055BS825246	•	RESISTOR, FXD, 1 OHM	5%, 3W						AR
	- 20 COML	•	747-5300-000 A2A4R12							
	- 21 MS35216-29	•	RESISTOR, 2.2 OHMS	5%, 3 W	V91637					AR
	- 22 K15J20S	•	747-5307-00 A2A4R12							
	- 22A RC07GF334K	•	RESISTOR, FXD, 3.1 OHMS	5%, 3 W	V91637					AR
	- 23 1N648	•	747-5310-000 A2A4R12							
	- 24 340-0641-00	•	POST, ELECTRICAL-MECHANICAL EQUIP.							4
	MS35338-81	•	ATTACHING PARTS							
	757-3019-001	•	SCREW V77250	342-0132-00						4
	- 25 340-0641-00	•	CAPACITOR, 100,000 UUF	20%, 200 VDCW						1
	- 26 MS35338-79	•	V56289 951-1030-00	A2A4C3						
	COML	•	RESISTOR, 470 OHMS	10%, 1/4 W	V01121					1
	- 27 340-0641-00	•	745-0737-00 A2A4R21	EFF MCN 1346						
	- 28 1N458	•	SB-25							
	- 29 3055BS825246	•	SEMICONDUCTOR DEVICE	V96214	353-6220-00					1
	- 30 COML	•	A2A4CR10							
	- 31 MS35216-29	•	SEMICONDUCTOR DEVICE	V96214	353-6220-00					1
	- 32 340-0641-00	•	A2A4CR9							
	MS35338-79	•	ATTACHING PARTS FOR 16 AND 17							
	COML	•	INSULATOR, NUT							2
	- 33 1N458	•	WASHER V79807	310-0284-00						2
	- 34 3055BS825246	•	TERMINAL, LUG							2
	- 35 1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00					1
	- 36 3055BS825246	•	A2A4CR8							
	- 37 20 COML	•	GROMMET V14370	200-1010-00						1
	- 38 MS35216-29	•	GROMMET 200-1030-00							1
	- 39 340-0641-00	•	SCREW V77250	343-0174-00						4
	MS35338-79	•	ATTACHING PARTS							
	COML	•	SLEEVE, SPG							4
	- 40 1N458	•	WASHER V79807	310-0282-00						4
	- 41 3055BS825246	•	WASHER 310-6360-00							4
	- 42 20 COML	•	SEMICONDUCTOR DEVICE	V03508	353-2609-00					1
	- 43 1N458	•	A2A4CR3	EFF THRU MCN 111						



FIG. & INDEX NO.	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
10	- 23 1N458	•	SEMICONDUCTOR DEVICE	V03508	353-0205-00					1
	- 23A RC07GF224K	•	A2A4CR3 EFF MCN 112							1
	- 24 1N458	•	RESISTOR, 220,000 OHMS 10%, 1/4 W V01121							1
	- 24A CM06F222J03	•	745-0833-00 A2A4R19 EFF MCN 112							1
	- 25 1N458	•	SEMICONDUCTOR DEVICE V03508 353-0205-00							1
	- 25 1N648	•	A2A4CR5							1
	- 26 RC20GF682K	•	CAPACITOR, 2200 UUF 5%, 500 VDCW V53021							1
	- 27 1N2613	•	912-3025-00 A2A4C6 EFF MCN 112							1
	- 27A 1N648	•	SEMICONDUCTOR DEVICE V03508 353-0205-00							1
	- 27B RC07GF682K	•	A2A4CR13 EFF THRU MCN 111							1
	- 27C RC07GF472K	•	SEMICONDUCTOR DEVICE V03508 353-2609-00							1
	- 28 RC07GF106K	•	A2A4CR13 EFF MCN 112							1
	- 29 RC07GF106K	•	RESISTOR, 6800 OHMS 10%, 1/2 W V01121							1
	- 30 1N648	•	745-1387-00 A2A4R17							1
	- 31 RC20GF682K	•	SEMICONDUCTOR DEVICE V03508 353-1908-00							1
	- 32 RC20GF103K	•	A2A4CR1							1
	- 33 DA15PC7	•	SEMICONDUCTOR DEVICE V03508 353-2609-00							1
	- 34 541-5951-002	•	A2A4CR15 EFF MCN 1346 SR-25							1
	- 35 4040-2HOT	•	RESISTOR, 6800 OHMS 10%, 1/4 W V01121							1
	TJNNED	•	745-0779-00 A2A4R23 EFF MCN 1346							1
	MS35649-24	•	SB-25							1
	MS35338-77	•	RESISTOR, 4700 OHMS 10%, 1/4 W V01121							1
	MS35216-6	•	745-0773-00 A2A4R22 EFF MCN 1346							1
	- 35A 4040-2HOT	•	SB-25							1
	TINNED	•	RESISTOR, 10 MEG 10%, 1/4 W V01121							1
	COML	•	745-0893-00 A2A4R16							1
	COML	•	RESISTOR, 10 MEG 10%, 1/4 W V01121							1
	COML	•	745-0893-00 A2A4R15							1
	COML	•	SEMICONDUCTOR DEVICE V03508 353-2609-00							1
	- 36 1N2613	•	A2A4CR4							1
	- 37 RC20GF103K	•	RESISTOR, 6800 OHMS 10%, 1/2 W V01121							1
	- 38 MP206-14B	•	745-1387-00 A2A4R18							1
	- 39 MP206-14B	•	RESISTOR, 10,000 OHMS 10%, 1/2 W V01121							1
		•	745-1394-00 A2A4R2							1
		•	CONNECTOR, RECP V91146 371-0169-00							1
		•	A2A4P1							1
		•	SPACER, SLV							2
		•	TERMINAL, LUG V77147 304-0014-00							2
			ATTACHING PARTS FOR 33 THRU 35							
		•	NUT V77250 313-0037-00							2
		•	WASHER V79807 310-0275-00							2
		•	SCREW V77250 343-0127-00							2
		- - * - -								2
	- 35A 4040-2HOT	•	TERMINAL, LUG V77147 304-0014-00 EFF							5
	TINNED	•	MCN 1346							
			ATTACHING PARTS							
	COML	•	NUT 313-0050-00 EFF MCN 1346							3
	COML	•	WASHER 310-0074-00							3
	COML	•	SCREW 342-0143-00 EFF MCN 1346							1
	COML	•	SCREW 343-0299-00 EFF MCN 1346							2
		- - * - -								
	- 36 1N2613	•	SEMICONDUCTOR DEVICE V03508 353-1908-00							1
	- 37 RC20GF103K	•	A2A4CR2							1
	- 38 MP206-14B	•	RESISTOR, 10,000 OHMS 10%, 1/2 W V01121							1
	- 39 MP206-14B	•	745-1394-00 A2A4R3							1
		•	COIL, 50 MH V05105 240-2012-00 A2A4L2							1
		•	COIL, 50 MH V95105 240-2012-00 A2A4L1							1



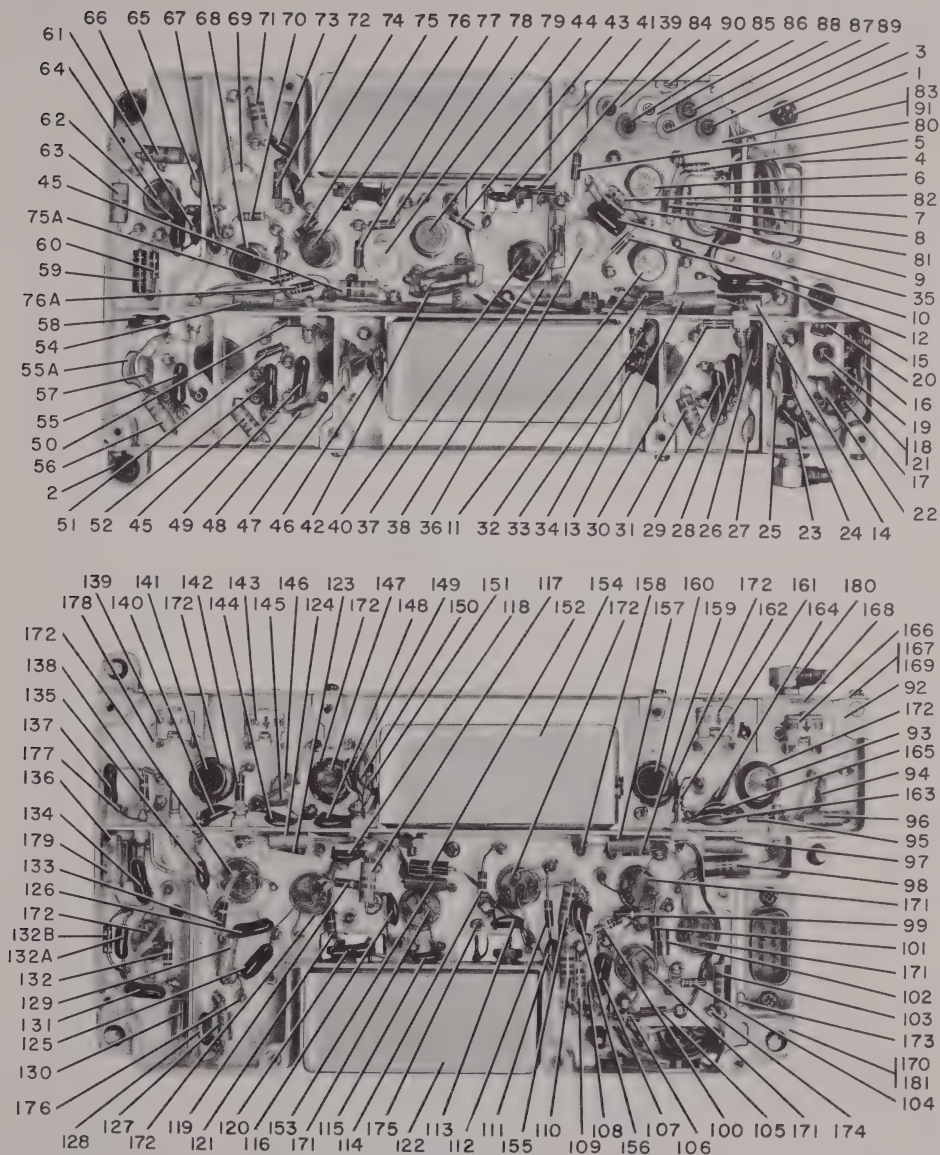
ILLUSTRATED PARTS CATALOG

SECTION IV
PULSE MODULATOR

FIG. -ITEM	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
10		ATTACHING PARTS FOR 38 AND 39								
	MS35216-27	•	SCREW	V77250	343-0171-00					2
	MS35338-79	•	WASHER	V79807	310-0282-00					2
		-	-	*	-	-	-	-		
- 40	554-2033-003	•	BLOCK, MTG, COIL							1
		ATTACHING PARTS								
	MS35216-12	•	SCREW	V77250	343-0133-00					2
	MS35338-78	•	WASHER	V79807	310-0279-00					2
		-	-	*	-	-	-	-		
- 41	196P47456S26	•	CAPACITOR, 470,000 UUF 5%, 600 VDCW							1
			V56289	931-6992-00	A2A4C4					
- 42	196P47456S26	•	CAPACITOR, 470,000 UUF 5%, 600 VDCW							1
			V56289	931-6992-00	A2A4C5					
		ATTACHING PARTS FOR 41 AND 42								
	546-1569-002	•	NUT, CAPACITOR							2
		-	-	*	-	-	-	-		
- 43	554-2031-002	•	RETAINER, CAPACITOR							1
		ATTACHING PARTS								
	MS35200-10	•	SCREW	V77250	342-0042-00					2
	MS35216-12	•	SCREW	V77250	343-0133-00					1
	MS35338-78	•	WASHER	V79807	310-0279-00					1
		-	-	*	-	-	-	-		
- 44	RC07GF121K	•	RESISTOR, 120 OHMS 10%, 1/4 W	V01121						1
			745-0716-00	A2A4R1						
- 45	AB396-1	•	TERMINAL, STUD	V12615	306-1281-00					1
		ATTACHING PARTS								
	COML	•	SCREW	343-0298-00						1
	COML	•	WASHER	310-0074-00						1
		-	-	*	-	-	-	-		
- 45A	G4777-10	•	TERMINAL, STUD	V12615	306-1018-00	EFF				1
			MCN 1346							
		ATTACHING PARTS								
	MS35200-2	•	SCREW	V77250	342-0132-00					1
	MS35338-77	•	WASHER	V79807	310-0275-00					1
		-	-	*	-	-	-	-		
- 46	554-2037-004	•	CHASSIS, ELECTRICAL EQUIP.							1
- 47	SL295-315	•	•	TERMINAL, STANDOFF	V12615	306-1264-00				3
- 48	SL275-197D	•	•	TERMINAL, FEEDTHRU	V12615	306-1524-00				3
	RED									
- 49	SL275-197D	•	•	TERMINAL, FEEDTHRU	V12615	306-1521-00				17
	WHT									
- 50	SL286-301D	•	•	TERMINAL, FEEDTHRU	V12615	306-1331-00				7
	WHT									
- 51	05-3307-51	•	•	SOCKET, TSTR	V91662	352-9903-00				2
				A2A4XQ1, A2A4XQ2						
		ATTACHING PARTS								
	A7575	•	•	RETAINER, TSTR SOC	V91662	352-9904-00				2
		-	-	*	-	-	-	-		
- 52	554-2030-002	•	•	BUSHING, CAPTIVE SCR						4
- 53	554-2036-004	•	•	CHASSIS, ELECTRICAL EQUIP.						1



ILLUSTRATED PARTS CATALOG



I-F Amplifier
Figure 11



ILLUSTRATED PARTS CATALOG

SECTION IV
I-F AMPLIFIER

FIG. -ITEM	PART NO.	NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
		1 2 3 4 5 6 7		
11 -	554-1631-00	I-F AMPLIFIER A2A6 SEE FIG. 9-2 FOR NHA		RFF
- 1	COML	• SCREW 343-0172-00 EFF THRU MCN 534		3
- 1	MS35216-28	• SCREW V77250 343-0173-00 EFF MCN 535		3
		ATTACHING PARTS		
	340-0641-00	• SLEEVE, SPG		3
	4706-05-01-4102	• WASHER V78189 373-0155-00		3
		- - * - -		
- 2	COML	• SCREW 347-0038-00		1
		ATTACHING PARTS		
	340-0641-00	• SLEEVE, SPG		1
	MS35338-79	• WASHER V79807 310-0282-00		1
	COML	• WASHER 310-0046-00		1
		- - * - -		
- 3	554-6329-003	• COVER, CHASSIS		1
		ATTACHING PARTS		
	MS35216-2	• SCREW V77250 343-0123-00		9
	MS35337-77	• WASHER V79807 310-0070-00		9
		- - * - -		
- 4	DE9PC7	• CONNECTOR, RECP V91146 371-0168-00		1
		A2A6P1		
		ATTACHING PARTS		
	MS35216-3	• SCREW V77250 343-0124-00		2
	MS35337-77	• WASHER V79807 310-0070-00		2
		- - * - -		
- 5	RC07GF473K	• RESISTOR, 47,000 OHMS 10%, 1/4 W V01121		1
		745-0809-00 A2A6R38		
- 6	2N337	• TRANSISTOR V96214 352-0099-00 A2A6Q11		1
- 7	KR033J35S	• CAPACITOR, 33,000 UUF 20%, 35 VDCW V56289		1
		184-7415-00 A2A6C61		
- 8	K2R2J20S	• CAPACITOR, 2.2 UUF 20%, 20 VDCW V05397		1
		184-7377-00 A2A6C53		
- 9	2N404A	• TRANSISTOR V96214 352-0378-00 A2A6Q10		1
- 10	RC07GF102K	• RESISTOR, 1000 OHMS 10%, 1/4 W V01121		1
		745-0749-00 A2A6R30		
- 11	2N337	• TRANSISTOR V96214 352-0099-00 A2A6Q9		1
- 12	CM06F561J03	• CAPACITOR, 560 UUF 5%, 500 VDCW V53021		1
		912-2983-00 A2A6C62		
- 13	MS16225-13	• COIL, 3.30 UH V09800 240-1574-00 A2A6L5		1
- 14	2500-14	• COIL, 500 UH V09800 240-2533-00 A2A6L2		1
- 15	RC07GF101K	• RESISTOR, 100 OHMS 10%, 1/4 W V01121		1
		745-0712-00 A2A6R1		
- 16	913-3942-00	• CAPACITOR, 470 UUF 20%, 500 VDCW A2A6C3		1
- 17	554-2260-002	• COIL, I-F A2A6L2		1
- 18	554-1972-002	• JACK ASSY, TIP		1
		ATTACHING PARTS		
	MS35200-2	• SCREW V77250 342-0132-00		1
		- - * - -		
- 19	SKT41VI0	• JACK, TIP V98291 360-0264-00 A2A6J7		1
- 20	F22NCFMA1-26	• NUT, SELF-LKG, CLINCH V72962		1
		333-0827-00		
- 21	554-1971-002	• JACK ASSY, TIP		1
- 22	913-3942-00	• CAPACITOR, 470 UUF 20%, 500 VDCW A2A6C6		1
- 23	CM05F220J03	• CAPACITOR, 22 UUF 5%, 500 VDCW V53021		1
		912-2768-00 A2A6C2		
- 24	805-014X5V0 103Z	• CAPACITOR, 10,000 UUF +80-20%, 100 VDCW V72982 913-3680-00 A2A6C12		1
- 25	913-3942-00	• CAPACITOR, 470 UUF 20%, 500 VDCW A2A6C10		1
- 26	805-014X5V0 103Z	• CAPACITOR, 10,000 UUF +80-20%, 100 VDCW V72982 913-3680-00 A2A6C5		1



FIG. -ITEM	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
11	- 27	913-3942-00	•	CAPACITOR, 470	UUF 20%, 500	VDCW	A2A6C11			1
	- 28	CM05E560J03	•	CAPACITOR, 56	UUF 5%, 500	VDCW	V53021			1
				912-2798-00	A2A6C8					
	- 29	CM05C120K03	•	CAPACITOR, 12	UUF 10%, 500	VDCW	V53021			1
				912-2757-00	A2A6C9					
	- 30	RC07GF102K	•	RESISTOR, 1000	OHMS 10%, 1/4	W	V01121			1
				745-0749-00	A2A6R4					
	- 31	MS16225-2	•	COIL, 0.22	UH	V99800	240-1563-00	A2A6L3		1
	- 32	RC07GF222K	•	RESISTOR, 2200	OHMS 10%, 1/4	W	V01121			1
				745-0761-00	A2A6R34					
	- 33	913-3942-00	•	CAPACITOR, 470	UUF 20%, 500	VDCW	A2A6C14			1
	- 34	RC07GF102K	•	RESISTOR, 1000	OHMS 10%, 1/4	W	V01121			1
				745-0749-00	A2A6R41					
	- 35	CM05F101J03	•	CAPACITOR, 100	UUF 5%, 500	VDCW	V53021			1
				912-2816-00	A2A6C51					
	- 36	538011E2P0	•	CAPACITOR, VAR, 9	TO 35 UUF, 200	VDCW				1
		94R		V72982	917-1225-00	A2A6C40				
	- 37	997F15	•	RESISTOR, 220	OHMS 10%, 0.5	W	V10646			1
				714-1721-00	A2A6RT1					
	- 38	MS16225-13	•	COIL, 3.30	UH	V99800	240-1574-00	A2A6L7		1
	- 39	RC07GF221K	•	RESISTOR, 220	OHMS 10%, 1/4	W	V01121			1
				745-0725-00	A2A6R24					
	- 40	2N2360	•	TRANSISTOR	V96214	352-0465-00	A2A6Q7			1
	- 41	CM05F101J03	•	CAPACITOR, 100	UUF 5%, 500	VDCW	V53021			1
				912-2816-00	A2A6C46					
	- 42	763H6	•	RESISTOR, 1000	OHMS 10%, 1	W	V10646			1
				714-1732-00	A2A6RT2					
	- 43	RC07GF683K	•	RESISTOR, 68,000	OHMS 10%, 1/4	W	V01121			1
				745-0815-00	A2A6R28					
	- 44	2N1711	•	TRANSISTOR	V96214	352-0400-00	A2A6Q12			1
	- 45	MS16225-21	•	COIL, 15	UH	V99800	240-1582-00	A2A6L1		1
	- 46	RC07GF221K	•	RESISTOR, 220	OHMS 10%, 1/4	W	V01121			1
				745-0725-00	A2A6R5					
	- 47	913-3942-00	•	CAPACITOR, 470	UUF 20%, 500	VDCW	A2A6C17			1
	- 48	913-3942-00	•	CAPACITOR, 470	UUF 20%, 500	VDCW	A2A6C22			1
	- 49	CM05E390J03	•	CAPACITOR, 39	UUF 5%, 500	VDCW	V53021			1
				912-2786-00	A2A6C19					
	- 50	RC07GF102K	•	RESISTOR, 1000	OHMS 10%, 1/4	W	V01121			1
				745-0749-00	A2A6R10					
	- 51	997F15	•	RESISTOR, 220	OHMS 10%, 0.5	W	V10646			1
				714-1721-00	A2A6RT3					
	- 52	CM05C180K03	•	CAPACITOR, 18	UUF 10%, 500	VDCW	V53021			1
				912-2763-00	A2A6C20					
	- 53	MS16225-2	•	COIL, 0.22	UH	V99800	240-1563-00	A2A6L8		1
	- 54	MS16225-13	•	COIL, 3.30	UH	V99800	240-1574-00			1
				A2A6L10						
	- 55	CM05E200J03	•	CAPACITOR, 20	UUF 5%, 500	VDCW	V53021			1
				912-2765-00	A2A6C27					
	- 55A	913-3942-00	•	CAPACITOR, 470	UUF 20%, 500	VDCW	A2A6C64			1
				EFF MCN 257	SB-20					
	- 56	MS16225-2	•	COIL, 0.22	UH	V99800	240-1563-00	A2A6L1		1
	- 57	913-3942-00	•	CAPACITOR, 470	UUF 20%, 500	VDCW	A2A6C29			1
	- 58	CM05F101J03	•	CAPACITOR, 100	UUF 5%, 500	VDCW	V53021			1
				912-2816-00	A2A6C63	EFF THRU MCN 2856				
	- 58	CM05E470J03	•	CAPACITOR, 47	UUF 5%, 500	VDCW	V72136			1
				912-2792-00	A2A6C63	EFF MCN 2857				
	- 59	RN60C1471F	•	RESISTOR, 1470	OHMS 1%, 1/8	W	V75042			1
				705-6277-00	A2A6R17					
	- 60	RC07GF392K	•	RESISTOR, 3900	OHMS 10%, 1/4	W	V01121			1
				745-0770-00	A2A6R16					
	- 61	CK60AW102M	•	CAPACITOR, 1000	UUF 20%, 1000	VDCW	V01939			1
				913-1186-00	A2A6C40	EFF THRU MCN 256				



ILLUSTRATED PARTS CATALOG

SECTION IV
I-F AMPLIFIER

FIG. -ITEM	PART NO.	NOMENCLATURE						USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6 7		
11 - 61	CM05F221J03	•	CAPACITOR, 220 UUF 5%, 500 VDCW	V53021					1
			912-2840-00 A2A6C40	EFF MCN 257					
			SB-20						
- 62	CM05E680J03	•	CAPACITOR, .68 UUF 5%, 500 VDCW	V53021					1
			912-2804-00 A2A6C55						
- 63	MS16225-5	•	COIL, 0.68 UH V99800	240-1566-00					1
			A2A6L21						
- 64	2N2362	•	TRANSISTOR V96214	352-0407-00	A2A6Q8				1
- 65	913-3942-00	•	CAPACITOR, 470 UUF 20%, 500 VDCW	A2A6C38					1
- 66	MS16225-7	•	COIL, 1 UH V99800	240-1568-00	A2A6L15				1
- 67	CK60AW102M	•	CAPACITOR, 1000 UUF 20%, 1000 VDCW	V01939					1
			913-1186-00 A2A6C34						
- 68	2N2398	•	TRANSISTOR V96214	352-0406-00	A2A6Q5				1
- 69	538011E2P0	•	CAPACITOR, VAR, 9 TO 35 UUF, 200 VDCW						1
	94R		V72982 917-1225-00	A2A6C31					
- 70	RC07GF472K	•	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121					1
			745-0773-00 A2A6R14						
- 71	MS16225-21	•	COIL, 15 UH V99800	240-1582-00	A2A6L12				1
- 72	RC07GF102K	•	RESISTOR, 1000 OHMS 10%, 1/4 W	V01121					1
			745-0749-00 A2A6R18						
- 73	805-014X5V0	•	CAPACITOR, 10,000 UUF +80-20%, 100 VDCW						1
	103Z		V72982 913-3680-00	A2A6C25					
- 74	805-014X5V0	•	CAPACITOR, 10,000 UUF +80-20%, 100 VDCW						1
	103Z		V72982 913-3680-00	A2A6C44					
- 75	RC07GF472K	•	RESISTOR, 4700 OHMS 10%, 1/4 W	V01121					1
			745-0773-00 A2A6R20						
- 75	997F20	•	RESISTOR, 500 OHMS 10%, 0.5 W	V10646					1
			714-1735-00 A2A6RT4	EFF MCN 257					
			SR-20						
- 76	2N2360	•	TRANSISTOR V96214	352-0465-00	A2A6Q6				1
- 76A	RN65R1210F	•	RESISTOR, 1210 OHMS 1%, 1/4 W	V75042					1
			705-7052-00 A2A6R7	EFF MCN 257	SP-20				
- 77	RC07GF102K	•	RESISTOR, 1000 OHMS 10%, 1/4 W	V01121					1
			745-0749-00 A2A6R22						
- 78	RC07GF272K	•	RESISTOR, 2700 OHMS 10%, 1/4 W	V01121					1
			745-0764-00 A2A6R21						
- 79	538011E2P0	•	CAPACITOR, VAR, 9 TO 35 UUF, 200 VDCW						1
	94R		V72982 917-1225-00	A2A6C42					
- 79A	763-3069-001	•	INSULATOR, CAPACITOR						3
- 80	RC07GF221K	•	RESISTOR, 220 OHMS 10%, 1/4 W	V01121					1
			745-0725-00 A2A6R25						
- 81	RC07GF822K	•	RESISTOR, 8200 OHMS 10%, 1/4 W	V01121					1
			745-0782-00 A2A6R29						
- 82	SPL1N904	•	SEMICONDUCTOR DEVICE V03508	353-2902-00					1
			A2A6CR2						
- 83	554-2280-003	•	JACK ASSY, TIP						1
			ATTACHING PARTS						
	MS35200-2	•	SCREW V77250	342-0132-00					2
			- - * - -						
- 84	SKT41BLU	•	JACK, TIP V98291	360-0263-00	A2A6J6				1
- 85	SKT41GRN	•	JACK, TIP V98291	360-0262-00	A2A6J5				1
- 86	SKT41YEL	•	JACK, TIP V98291	360-0261-00	A2A6J4				1
- 87	SKT41ORN	•	JACK, TIP V98291	360-0260-00	A2A6J3				1
- 88	SKT41RED	•	JACK, TIP V98291	360-0259-00	A2A6J2				1
- 89	SKT41BRN	•	JACK, TIP V98291	360-0258-00	A2A6J1				1
- 90	F22NCFMA1-26	•	NUT, SELF-LKG, CLINCH V72962						2
			333-0837-00						
- 91	554-2279-003	•	JACK ASSY, TIP						1
- 92	554-1977-003	•	COVER, CHASSIS						1



ILLUSTRATED PARTS CATALOG

FIG. -ITEM	PART NO.	NOMENCLATURE						USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7	
11		ATTACHING PARTS							
	MS35200-2	•	SCREW	V77250	342-C132-00				9
			-	-	*	-	-		
- 93	2N2360	•	TRANSISTOR	V96214	352-0465-00	A2A6Q1			1
- 94	913-3942-00	•	CAPACITOR,	470 UUF	20%, 500 VDCW	A2A6C1			1
- 95	RC07GF102K	•	RESISTOR,	1000 OHMS	10%, 1/4 W	VO1121			1
			745-0749-00	A2A6R2					
- 96	MS16225-3	•	COIL,	0.33 UH	V99800	240-1564-00	A2A6L1		1
- 97	MS16225-13	•	COIL,	3.30 UH	V99800	240-1574-00	A2A6L4		1
- 98	2500-14	•	COIL,	500 UH	V99800	240-2523-00	A2A6L22		1
- 99	RC07GF682K	•	RESISTOR,	6800 OHMS	10%, 1/4 W	VO1121			1
			745-0779-00	A2A6R40					
-100	1N830A	•	SEMICONDUCTOR DEVICE	V03508	353-3495-00				1
			A2A6CR1						
-101	RC07GF182K	•	RESISTOR,	1800 OHMS	10%, 1/4 W	VO1121			1
			745-0758-00	A2A6R32					
-102	K2R2J20S	•	CAPACITOR,	2.2 UF	20%, 20 VDCW	V05397			1
			184-7377-00	A2A6C52					
-103	MS16225-21	•	COIL,	15 UH	V99800	240-1582-00	A2A6L20		1
-104	RC07GF473K	•	RESISTOR,	47,000 OHMS	10%, 1/4 W	VO1121			1
			745-0809-00	A2A6R33					
-105	RC07GF682K	•	RESISTOR,	6800 OHMS	10%, 1/4 W	VO1121			1
			745-0779-00	A2A6R39					
-106	RC07GF224K	•	RESISTOR,	220,000 OHMS	10%, 1/4 W	VO1121			1
			745-0833-00	A2A6R36	EFF THRU MCN 299				
-106	RC07GF474K	•	RESISTOR,	470,000 OHMS	10%, 1/4 W	VO1121			1
			745-0845-00	A2A6R36	EFF MCN 300				
			SR-12						
-107	CM05F391J03	•	CAPACITOR,	390 UUF	5%, 500 VDCW	V53021			1
			912-2858-00	A2A6C60					
-108	RC07GF103K	•	RESISTOR,	10,000 OHMS	10%, 1/4 W	VO1121			1
			745-0785-00	A2A6R37					
-109	MS16225-21	•	COIL,	15 UH	V99800	240-1582-00	A2A6L24		1
-110	MS16225-21	•	COIL,	15 UH	V99800	240-1582-00	A2A6L19		1
-111	805-014X5V0 103Z	•	CAPACITOR,	10,000 UUF	+80-20%, 100 VDCW				1
			V72982	913-3680-00	A2A6C48				
-112	RC07GF222K	•	RESISTOR,	2200 OHMS	10%, 1/4 W	VO1121			1
			745-0761-00	A2A6R26					
-113	805-014X5V0 103Z	•	CAPACITOR,	10,000 UUF	+80-20%, 100 VDCW				1
			V72982	913-3680-00	A2A6C47				
-114	RC07GF392K	•	RESISTOR,	3900 OHMS	10%, 1/4 W	VO1121			1
			745-0770-00	A2A6R27					
-115	805-014X5V0 103Z	•	CAPACITOR,	10,000 UUF	+80-20%, 100 VDCW				1
			V72982	913-3680-00	A2A6C54				
-116	805-014X5V0 103Z	•	CAPACITOR,	10,000 UUF	+80-20%, 100 VDCW				1
			V72982	913-3680-00	A2A6C43				
-117	MS16225-17	•	COIL,	6.80 UH	V99800	240-1578-00			1
			A2A6L16						
-118	805-014X5V0 103Z	•	CAPACITOR,	10,000 UUF	+80-20%, 100 VDCW				1
			V72982	913-3680-00	A2A6C41				
-119	RC07GF101K	•	RESISTOR,	100 OHMS	10%, 1/4 W	VO1121			1
			745-0713-00	A2A6R19					
-120	DM15C100J01	•	CAPACITOR,	10 UUF	5%, 500 VDCW	V72136			1
			912-2753-00	A2A6C45					
-121	RC07GF332K	•	RESISTOR,	3300 OHMS	10%, 1/4 W	VO1121			1
			745-0767-00	A2A6R23					
-122	X665-3	•	FILTER, BAND PASS	V81815	241-0476-00				1
			A2A6FL2						



ILLUSTRATED PARTS CATALOG

SECTION IV
IF. AMPLIFIER

FIG. & INDEX NO.	PART NO.	NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
		1 2 3 4 5 6 7		
11		ATTACHING PARTS		
	COML	• NUT 313-0051-00		2
	COML	• WASHER 310-0076-00		2
	COML	• WASHER 310-0054-00		2
		- - * - -		
-123	1N270	• SEMICONDUCTOR DEVICE V03508 353-2018-00 A2A6C33 EFF THRU MCN 256 ONLY		1
-124	MS16225-13	• COIL, 3.30 UH V99800 240-1574-00 A2A6L9		1
-125	CM05E390J03	• CAPACITOR, 39 UUF 5%, 500 VDCW V53021 912-2786-00 A2A6C32		1
-126	CM05E200J03	• CAPACITOR, 20 UUF 5%, 500 VDCW V53021 912-2765-00 A2A6C33		1
-127	K2R2J20S	• CAPACITOR, 2.2 UF 20%, 20 VDCW V05397 184-7377-00 A2A6C59		1
-128	805-014X5V0 103Z	• CAPACITOR, 10,000 UUF +80-20%, 100 VDCW V72982 913-3680-00 A2A6C37		1
-129	MS16225-17	• COIL, 6.80 UH V99800 240-1578-00 A2A6L13		1
-130	MS16225-13	• COIL, 3.30 UH V99800 240-1574-00 A2A6L14		1
-131	CM05E200J03	• CAPACITOR, 20 UUF 5%, 500 VDCW V53021 912-2765-00 A2A6C39		1
-132	RC07GF392K	• RESISTOR, 3900 OHMS 10%, 1/4 W V01121 745-0770-00 A2A6R15		1
-132A	913-3942-00	• CAPACITOR, 470 UUF 20%, 500 VDCW A2A6C65 EFF MCN 535 SR-20		1
-132B	MS16225-21	• COIL, 15 UH V99800 240-1582-00 A2A6L25 EFF MCN 535 SB-20		1
-133	RC07GF101K	• RESISTOR, 100 OHMS 10%, 1/4 W V01121 745-0713-00 A2A6R13		1
-134	CM05E680J03	• CAPACITOR, 68 UUF 5%, 500 VDCW V53021 912-2804-00 A2A6C36 EFF THRU MCN 2856		1
-134	CM05F101J03	• CAPACITOR, 100 UUF 5%, 500 VDCW V53021 912-2816-00 A2A6C36 EFF MCN 2857		1
-134A	RC07GF220K	• RESISTOR, 22 OHMS 10%, 1/4 W V01121 745-0689-00 A2A6R42 EFF MCN 2857		1
-135	CK60AW102M	• CAPACITOR, 1000 UUF 20%, 1000 VDCW V01939 913-1186-00 A2A6C56		1
-136	CR55U52-3000 OMC	• CRYSTAL UNIT, QTZ V85675 289-0561-00 A2A6Y1		1
-137	CM05E390J03	• CAPACITOR, 39 UUF 5%, 500 VDCW V53021 912-2786-00 A2A6C26		1
-138	RC07GF102K	• RESISTOR, 1000 OHMS 10%, 1/4 W V01121 745-0749-00 A2A6R12		1
-139	917-1215-00	• CAPACITOR, VAR, 9 TO 35 UUF, 200 VDCW A2A6C25		1
-140	805-014X5V0 103Z	• CAPACITOR, 10,000 UUF +80-20%, 100 VDCW V72982 913-3680-00 A2A6C58		1
-141	2N2360	• TRANSISTOR V96214 352-0465-00 A2A6Q4		1
-142	RC07GF221K	• RESISTOR, 220 OHMS 10%, 1/4 W V01121 745-0725-00 A2A6R8		1
-143	917-1215-00	• CAPACITOR, VAR, 9 TO 35 UUF, 200 VDCW A2A6C18		1
-144	805-014X5V0 103Z	• CAPACITOR, 10,000 UUF +80-20%, 100 VDCW V72982 913-3680-00 A2A6C30		1
-145	913-3942-00	• CAPACITOR, 470 UUF 20%, 500 VDCW A2A6C24		1
-146	913-3942-00	• CAPACITOR, 470 UUF 20%, 500 VDCW A2A6C28		1
-147	2N2360	• TRANSISTOR V96214 352-0465-00 A2A6Q3		1
-148	805-014X5V0 103Z	• CAPACITOR, 10,000 UUF +80-20%, 100 VDCW V72982 913-3680-00 A2A6C57		1
-149	805-014X5V0 103Z	• CAPACITOR, 10,000 UUF +80-20%, 100 VDCW V72982 913-3680-00 A2A6C23		1
-150	913-3942-00	• CAPACITOR, 470 UUF 20%, 500 VDCW A2A6C21		1
-151	RC07GF102K	• RESISTOR, 1000 OHMS 10%, 1/4 W V01121 745-0749-00 A2A6R6		1

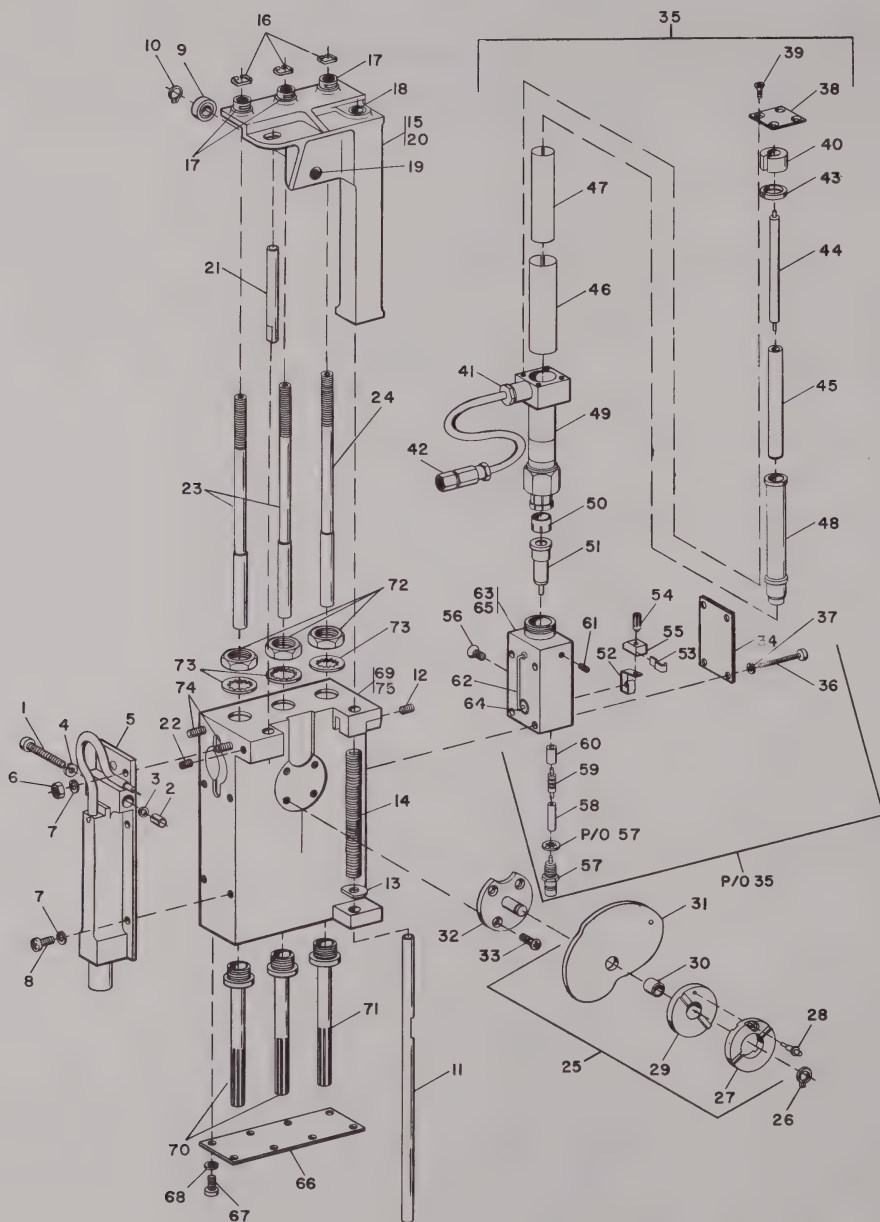


FIG. & INDEX NO.	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
11	-152	RC20GF222K	•	RESISTOR, 2200 OHMS 10%, 1/2 W	V01121					1
			•	745-1366-00	A2A6R35					
	-153	RN60D1000F	•	RESISTOR, 100 OHMS 1%, 1/8 W	V75042					1
			•	705-6548-00	A2A6R9					
	-154	X690-2	•	FILTER, BAND PASS	V81815	241-0477-00				1
			•	A2A6FL1						
			•	ATTACHING PARTS						
		COML	•	NUT	313-0051-00					2
		COML	•	WASHER	310-0076-00					2
		COML	•	WASHER	310-0054-00					2
			•	- - * - -						
	-155	MS16225-21	•	COIL, 15 UH	V99800	240-1582-00	A2A6L1R			1
	-156	805-014X5V0	•	CAPACITOR, 10,000 UUF +80-20%, 100 VDCW						1
		103Z	•	V72982	913-3680-00	A2A6C50				
	-157	MS16225-13	•	COIL, 3.30 UH	V99800	240-1574-00	A2A6L6			1
	-158	G4777-10	•	TERMINAL, STUD	V12615	306-1018-00				2
			•	ATTACHING PARTS						
		MS35216-1	•	SCREW	V77250	343-0122-00				2
		MS35337-77	•	WASHER	V79807	310-0070-00				2
			•	- - * - -						
	-159	RC07GF183K	•	RESISTOR, 18,000 OHMS 10%, 1/4 W	V01121					1
			•	745-0794-00	A2A6R31					
	-160	2N2360	•	TRANSISTOR	V96214	352-0465-00	A2A6Q2			1
	-161	RC07GF151K	•	RESISTOR, 150 OHMS 10%, 1/4 W	V01121					1
			•	745-0719-00	A2A6R3					
	-162	917-1215-00	•	CAPACITOR, VAR, 9 TO 35 UUF, 200 VDCW						1
			•	A2A6C7						
	-163	913-3942-00	•	CAPACITOR, 470 UUF 20%, 500 VDCW	A2A6C13					1
	-164	913-3942-00	•	CAPACITOR, 470 UUF 20%, 500 VDCW	A2A6C15					1
	-165	805-014X5V0	•	CAPACITOR, 10,000 UUF +80-20%, 100 VDCW						1
		103Z	•	V72982	913-3680-00	A2A6C16				
	-166	917-1215-00	•	CAPACITOR, VAR, 9 TO 35 UUF, 200 VDCW						1
			•	A2A6C4						
	-167	554-6330-003	•	COVER, CHASSIS						1
			•	ATTACHING PARTS						
		MS35216-2	•	SCREW	V77250	343-0123-00				4
		MS35337-77	•	WASHER	V79807	310-0070-00				4
			•	- - * - -						
	-168	554-1973-002	•	GROMMET, PLASTIC						4
	-169	554-1979-003	•	COVER, CHASSIS						1
	-170	554-2263-005	•	CHASSIS, ELECTRICAL EQUIP.						1
	-171	05-3307-51	•	SOCKET, TSTR	V91662	352-9903-00				4
			•	A2A6XQ9 THRU A2A6XQ12						
	-172	05-3307-01	•	SOCKET, TSTR	V91662	352-9902-00				8
			•	A2A6XQ1 THRU A2A6XQ8						
			•	ATTACHING PARTS						
		A7575	•	RETAINER, TSTR SOC	V91662	352-9904-00				8
			•	- - * - -						
	-173	A25HOTTINNED	•	EYELET	V57771	307-1218-00				1
	-174	SL275-197D	•	TERMINAL, FEEDTHRU	V12615	306-1521-00				14
		WHT	•	EFF THRU MCN	2856					
	-174	DP439-433	•	TERMINAL	V21242	306-1521-000				15
		WHT	•	EFF MCN	2857					
	-175	SS5169	•	TERMINAL, STUD	V86577	306-0983-00				13
			•	TERMINAL, STUD	V86577	306-0983-00				13
	-176	SL278-198D	•	TERMINAL, STANDOFF	V12615	306-1819-00				18
	-177	SL286-301D	•	TERMINAL, FEEDTHRU	V12615	306-1331-00				49
		WHT	•							
	-178	SS5170	•	TERMINAL, FEEDTHRU	V86577	306-0989-00				12
	-179	504-8229-001	•	CLIP						1
			•	ATTACHING PARTS						
		MS16535-51	•	RIVET	V12014	305-0146-00				1
			•	- - * - -						
	-180	554-2105-002	•	CONNECTOR, ELECTRICAL	A2A6J8					1
	-181	554-1970-005	•	CHASSIS, ELECTRICAL EQUIP.						1



ILLUSTRATED PARTS CATALOG

SECTION IV
PRESELECTOR



Preselector
Figure 12



FIG. -ITEM	PART NO.	NOMENCLATURE	USAGE		UNITS PER ASSY.		
			CODE				
		1 2 3 4 5 6 7					
12	-	554-1633-00	PRESELECTOR	A2A5	SEE FIG. 9-3 FOR NHA	REF	
	- 1	MS35216-30	• SCREW	V77250	343-0175-00	1	
			ATTACHING PARTS				
	- 2	340-0641-00	• SLEEVE,	SPG		1	
	- 3	500-9073-001	• SPACER			1	
	- 4	MS35337-79	• WASHER	V79807	310-0071-00	1	
			- - * - -				
	- 5	554-2143-004	• COUPLER,	ANT.		1	
			ATTACHING PARTS				
	- 6	COML	• NUT	313-0156-00		2	
	- 7	COML	• WASHER	310-0076-00		6	
	- 8	COML	• SCREW	343-0285-00		4	
			- - * - -				
	- 9	S187-375HHP 15LG31	• BEARING,	BALL,	ANNULAR	V40920	1
				309-1973-010			
			ATTACHING PARTS				
	- 10	MS16624-18	• RING,	RETAINING	V89462	340-0004-00	1
			- - * - -				
	- 11	554-1769-002	• ROD,	GUIDE			1
			ATTACHING PARTS				
	- 12	MS51053-126	• SETSCREW	V08664	328-0006-00		1
			- - * - -				
	- 13	554-1772-002	• WASHER,	FLAT			1
	- 14	554-1771-002	• SPRING,	HELICAL,	COMPRESSION		1
	- 15	554-1815-004	• TABLE,	TUN			1
			ATTACHING PARTS				
	- 16	547-1674-002	• SPRING,	LKG			2
			- - * - -				
	- 17	547-1675-002	• NUT ROD,	ADJUSTING			2
	- 18	A309-9MILL 6085	• BEARING,	SLV	V70417	309-0020-00	2
	- 19	554-1770-002	• SHAFT,	SHOULDERED			1
	- 20	554-1814-004	• TABLE,	TUN			1
	- 21	554-1768-002	• ROD,	GUIDE			1
			ATTACHING PARTS				
	- 22	MS51053-126	• SETSCREW	V08664	328-0006-00		1
			- - * - -				
	- 23	554-1804-003	• CONDUCTOR,	CENTER			2
	- 24	554-1803-003	• CONDUCTOR,	CENTER			1
	- 25	554-1811-004	• CAM,	COUPLING ASSY			1
			ATTACHING PARTS				
	- 26	MS16624-18	• RING,	RETAINING	V89462	340-0004-00	1
			- - * - -				
	- 27	540-2172-002	• GUIDE,	COUPLING			1
			ATTACHING PARTS				
	- 28	554-1873-002	• PIN,	GUIDE			1
			- - * - -				
	- 29	554-1797-003	• COUPLING	HALF,	SHAFT		1
	- 30	AA309-3MILL 6085A	• BEARING,	SLV	V70417	309-0428-00	1
	- 31	554-1799-003	• CAM,	CONTROL			1
	- 32	554-1798-003	• SHAFT,	STUB			1
			ATTACHING PARTS				
	- 33	MS35200-1	• SCREW	V77250	342-0131-00		4
			- - * - -				
	- 34	554-1789-002	• COVER,	HOUSING,	MIXER		1
	- 35	554-1822-005	• CRYSTAL	MIXER ASSY			1



ILLUSTRATED PARTS CATALOG

SECTION IV
PRESELECTOR

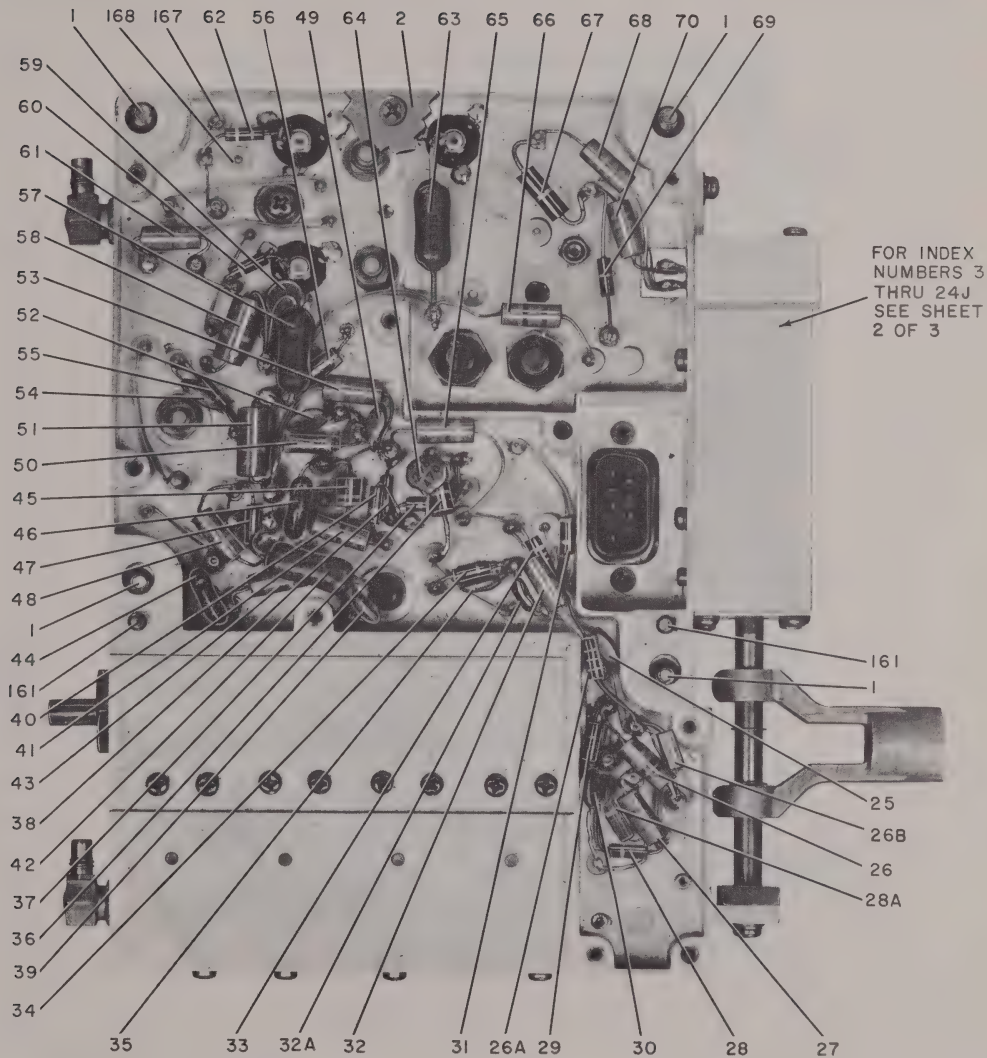
FIG. -ITEM	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
12		ATTACHING PARTS FOR 34 AND 35								
- 36	COML							• SCREW 343-0304-00		4
- 37	COML							• WASHER 310-0074-00		4
								- - * - -		
- 38	554-1785-002							• COVER, HOUSING, CHOKE		1
								ATTACHING PARTS		
- 39	MS35200-7							• SCREW V77250 342-0131-00		4
								- - * - -		
- 40	554-1777-002							• SPACER		1
- 41	554-6332-002							• FERRULE, R-F CABLE, GROUNDING		1
- 42	3000							• CONNECTOR, PLUG V98291 357-9836-00		1
								A2A5P1		
- 43	554-1778-002							• SPACER		1
- 44	554-1779-002							• CONDUCTOR, CHOKE		1
- 45	554-1780-002							• INSULATOR		1
- 46	554-1784-002							• INSULATOR, PLATE		1
- 47	554-1783-002							• INSULATOR, PLATE		1
- 48	554-1806-002							• CONDUCTOR, CHOKE		1
- 49	554-2277-002							• HOUSING ASSY, CHOKE		1
- 50	554-1807-002							• HOLDER, SEMICONDUCTOR DEVICE		1
- 51	MA4127							• SEMICONDUCTOR DEVICE V96341		1
								353-3436-00 A2A5CR1		
- 52	554-2278-002							• LINK, XTAL		1
- 53	554-6319-002							• TAP, TUN		1
- 54	554-2276-002							• CONTACT, ELECTRICAL		1
- 55	554-2274-002							• BLOCK, SUPPORTING		1
								ATTACHING PARTS		
- 56	COML							• SCREW 330-2099-00		1
								- - * - -		
- 57	3012							• CONNECTOR, RECP V98291 357-9740-00		1
								A2A5J1		
- 58	554-1787-002							• COUPLER, SLV		1
- 59	RC20GF560K							• RESISTOR, 56 OHMS 10%, 1/2 W V01121		1
								745-1200-00 A2A5R1		
- 60	554-1788-002							• COUPLER, SLV		1
								ATTACHING PARTS		
- 61	COML							• SETSCREW 335-0037-00 EFF THRU MCN 111		1
- 61	MS51053-412							• SETSCREW V08664 335-0125-00 EFF		1
								MCN 112		
								- - * - -		
- 62	554-1790-002							• COUPLING, LOOP, MIXER		1
- 63	554-1821-002							• HOUSING, MIXER		1
- 64	554-1786-002							• INSULATOR, RUSH.		1
- 65	554-2119-004							• HOUSING, MIXER		1
- 66	554-1773-002							• COVER, TUNER		1
								ATTACHING PARTS		
- 67	COML							• SCREW 343-0285-00		8
- 68	COML							• WASHER 310-0076-00		8
								- - * - -		
- 69	554-1801-002							• CHASSIS, ELECTRICAL EQUIP.		1
- 70	554-1818-004							• CONDUCTOR, CENTER		2
- 71	554-1817-004							• CONDUCTOR, CENTER		1
								ATTACHING PARTS FOR 70 AND 71		
- 72	A140406-14							• NUT V77250 334-4060-00		3
- 73	1912-00-00-2480							• WASHER V78189 373-0081-00		3
								- - * - -		
- 74	COML							• STUD 312-0063-00		2
- 75	554-2121-004							• CHASSIS, ELECTRICAL EQUIP.		1

SECTION IV

FREQUENCY MULTIPLIER AMPLIFIER



ILLUSTRATED PARTS CATALOG

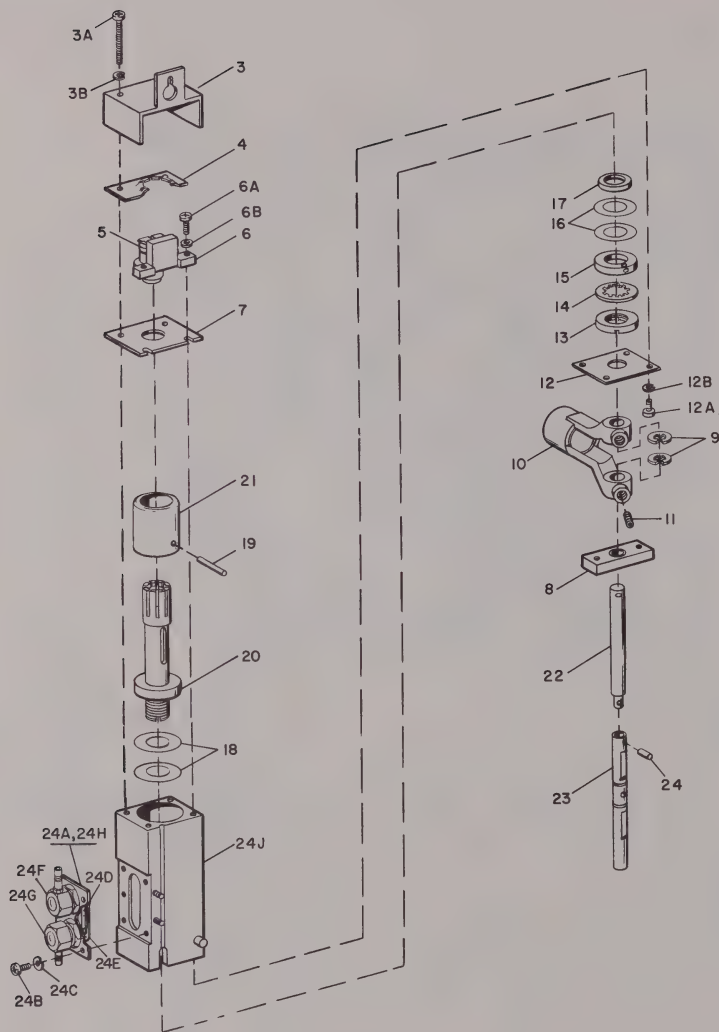


Frequency Multiplier Amplifier (Sheet 1 of 3)
Figure 13



ILLUSTRATED PARTS CATALOG

SECTION IV
FREQUENCY MULTIPLIER
AMPLIFIER



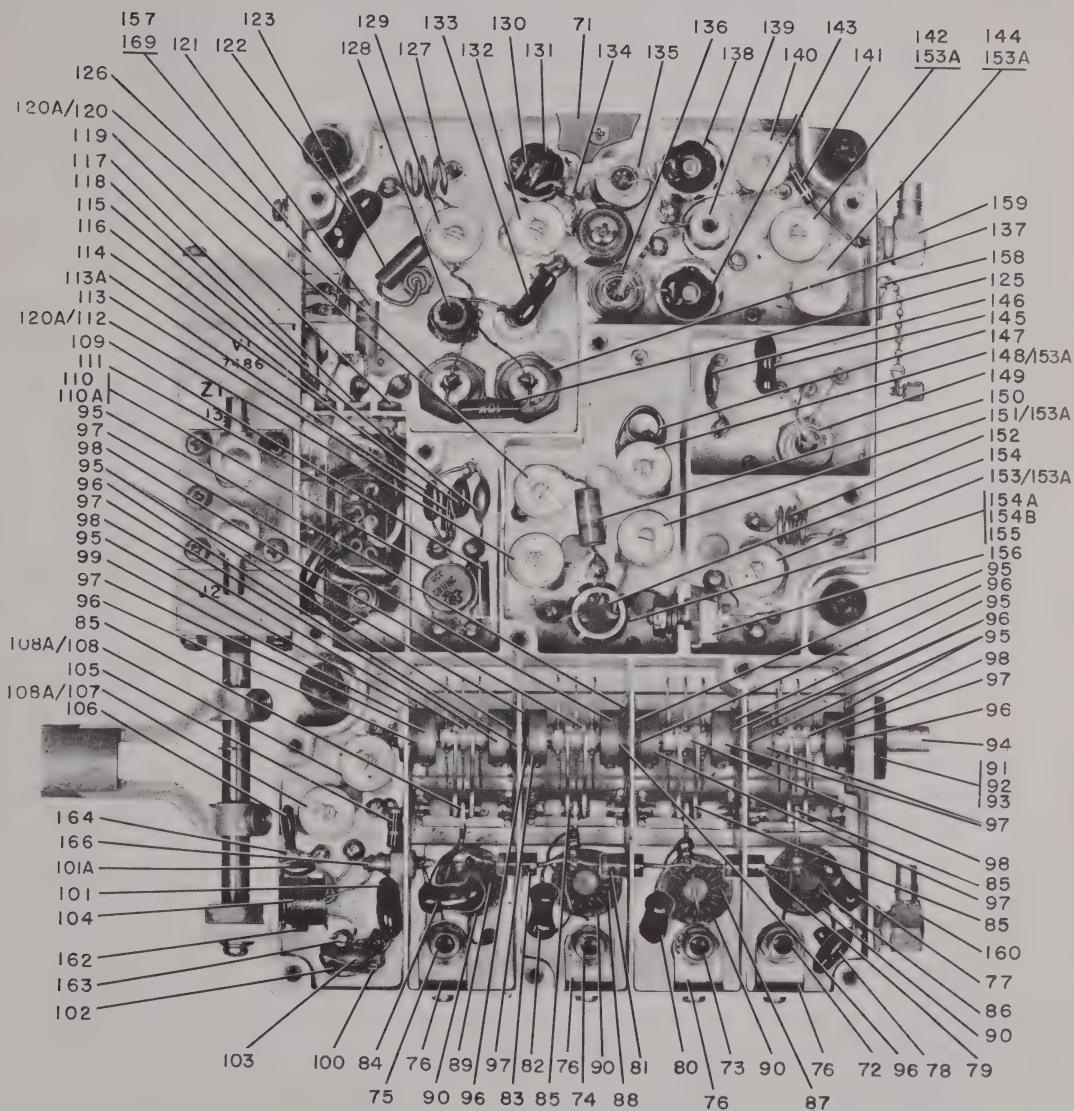
Frequency Multiplier Amplifier (Sheet 2 of 3)
Figure 13

SECTION IV

FREQUENCY MULTIPLIER AMPLIFIER



ILLUSTRATED PARTS CATALOG



Frequency Multiplier Amplifier (Sheet 3 of 3)
Figure 13



ILLUSTRATED PARTS CATALOG

SECTION IV FREQUENCY MULTIPLIER AMPLIFIER

FIG. & INDEX NO.	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
-	554-1630-00	FREQUENCY MULTIPLIER AMPLIFIER A2A2 SFF FIG. 9-4 FOR NHA								REF
- 1	MS35216-28	• SCREW V77250 343-0173-00								4
		ATTACHING PARTS								
	340-0641-00	• SLEEVE, SPG								4
	4706-05-01-4102	• WASHER V78189 373-0155-00								4
		- - * - -								
- 2	554-2022-005	• COVER, AMPL MULTIPLIER								1
		ATTACHING PARTS								
	MS35200-2	• SCREW V77250 342-0132-00								10
		- - * - -								
- 2A	NO NUMBER	• CAVITY ASSY, INJECTION TUN								1
		ATTACHING PARTS								
	68-1660-26	• NUT, SELF-LKG, HEX. V72962 333-0604-00								2
	MS35337-77	• WASHER V79807 310-0070-00								5
	COML	• WASHER 310-6320-00								3
	MS35216-4	• SCREW V77250 343-0125-00								3
	MS35216-2	• SCREW V77250 343-0123-00								2
		- - * - -								
- 3	554-6360-003	• COVER, CAVITY								1
		ATTACHING PARTS								
- 3A	MS35216-8	• SCREW V77250 343-0005-00								2
- 3B	MS35337-77	• WASHER V79807 310-0070-00								2
		- - * - -								
- 4	554-6340-002	• PLATE, PRESS.								1
- 5	7486	• ELECTRON TUBE V85599 256-0134-00 A2A2V1								1
		OR								
- 5	7077	• ELECTRON TUBE V33173 255-0341-000 A2A2V1 EFF SIL 37-66								1
- 6	554-6356-002	• SOCKET, TUBE A2A2XV1 EFF THRU MCN 111								1
- 6	CD5900	• SOCKET, ELECTRON TUBE V04435 220-1509-00 A2A2XV1 EFF MCN 112 ATTACHING PARTS								1
- 6A	MS35216-4	• SCREW V77250 343-0125-00								2
- 6B	542-7481-003	• WASHER								2
		- - * - -								
- 7	554-6336-002	• COVER, TOP								1
- 8	554-6334-003	• PLATE, BRG								1
- 9	MS16632-1018	• RING, RETAINING V89462 340-0113-00								2
- 10	554-6355-002	• HOUSING ASSY								1
		ATTACHING PARTS								
- 11	MS51053-412	• SETSCREW V08664 335-0125-00								2
		- - * - -								
- 12	554-6337-002	• COVER, BOTTOM								1
		ATTACHING PARTS								
- 12A	MS35216-2	• SCREW V77250 343-0123-00								4
- 12B	MS35337-77	• WASHER V79807 310-0070-00								4
		- - * - -								
- 13	P334-0249-00	• NUT V77250 334-0249-00								1
- 14	MS35333-75	• WASHER V78189 373-0045-00								1
- 15	554-6347-002	• TERMINAL, LUG								1
- 16	553-5076-003	• WASHER								2
- 17	553-5075-003	• WASHER								1
- 18	553-5076-003	• WASHER								2
- 19	554-6338-002	• PIN, STRAIGHT, HDLS								1
- 20	554-6349-003	• CONDUCTOR, ROD								1
- 21	554-6339-002	• SLUG, TUN								1

SECTION IV

FREQUENCY MULTIPLIER
AMPLIFIER



ILLUSTRATED PARTS
CATALOG

FIG. & INDEX NO.	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
13	- 21A 554-6353-004	.	.	CONDUCTOR SUBASSEMBLY						1
	- 22 554-6350-003	.	.	SHAFT, EXTENSION DRILL ON						1
				INSTALLATION						
	- 23 554-6344-002	.	.	SHAFT, SLUG DRILL ON INSTALLATION						1
				ATTACHING PARTS FOR 22 AND 23						
	- 24 047-0187MDP	.	.	PIN V00287 311-0438-00						1
		-	-	* - -						
	- 24A 554-6345-002	.	.	INJECTOR SUBASSEMBLY						1



FIG. -ITEM	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
13		ATTACHING PARTS								
- 24R	MS35216-1	• •	SCRFW	V77250	343-0122-00					5
- 24C	MS35337-77	• •	WASHER	V79807	310-0070-00					5
		- - *	- -							
- 24D	554-6342-002	• • •	LEAD, ELECTRICAL							1
- 24F	554-6343-002	• • •	LEAD, ELECTRICAL							1
- 24E	554-2105-002	• • •	CONNECTOR, ELECTRICAL	A2A2J2						1
- 24G	554-2105-002	• • •	CONNECTOR, ELECTRICAL	A2A2J2						1
- 24H	554-6341-002	• • •	PLATE, RETAINING							1
- 24J	554-6352-004	• •	CAVITY, INJECTION							1
- 25	912-3942-00	•	CAPACITOR, 470 UUF 20%, 500 VDCW	A2A2C50						1
			EFF THRU MCN 256							
- 25	CM05E300J03	•	CAPACITOR, 30 UUF 5%, 500 VDCW	V53021						1
			912-2777-00	A2A2C50	EFF MCN 257					
			SR-17							
- 26	MS16225-2	•	COIL, 0.22 UH	V99800	240-1563-00					1
			A2A2L23	EFF THRU MCN 256						
- 26A	MS16225-3	•	COIL, 0.33 UH	V99800	240-1564-00					1
			A2A2L23	EFF MCN 257	SR-17					
- 26R	GA3-3UUF0RM 5PCT	•	CAPACITOR, 3.3 UUF 5%, 500 VDCW	V78488						1
			913-2989-00	A2A2C64	SR-17					
- 27	MS16225-9	•	COIL, 1.50 UH	V99800	240-1570-00	A2A2L5				1
- 28	RC07GF122K	•	RESISTOR, 1200 OHMS 10%, 1/4 W	VO1121						1
			745-0752-00	A2A2R2						
- 28A	150D105X9035 A2	•	CAPACITOR, 1 UUF 10%, 35 VDCW	V56289						1
			184-7697-00	A2A2C62	SR-17					
- 29	RC07GF102K	•	RESISTOR, 1000 OHMS 10%, 1/4 W	VO1121						1
			745-0749-00	A2A2R2						
- 30	CK60AW681M	•	CAPACITOR, 680 UUF 20%, 1000 VDCW	VO1939						1
			913-1194-00	A2A2C15	SR-17					
- 31	RC07GF472K	•	RESISTOR, 4700 OHMS 10%, 1/4 W	VO1121						1
			745-0773-00	A2A2R6						
- 32	MS16225-14	•	COIL, 3.90 UH	V99800	240-1575-00	A2A2L6				1
- 32A	DM15C120J01	•	CAPACITOR, 12 UUF 5%, 500 VDCW	V72136						1
			912-2756-00	A2A2C63						
- 33	RC07GF223K	•	RESISTOR, 22,000 OHMS 10%, 1/4 W	VO1121						1
			745-0797-00	A2A2R5	EFF THRU MCN 111					
- 33	RC07GF822K	•	RESISTOR, 8200 OHMS 10%, 1/4 W	VO1121						1
			745-0782-00	A2A2R5	EFF MCN 112					
- 34	RC07GF821K	•	RESISTOR, 820 OHMS 10%, 1/4 W	VO1121						1
			745-0746-00	A2A2R11						
- 35	913-3942-00	•	CAPACITOR, 470 UUF 20%, 500 VDCW	A2A2C27						1
- 36	GA2-2UUF0RM 5PCT	•	CAPACITOR, 2.2 UUF 5%, 500 VDCW	V78488						1
			913-2985-00	A2A2C54						
- 37	RC07GF222K	•	RESISTOR, 2200 OHMS 10%, 1/4 W	VO1121						1
			745-0761-00	A2A2R8						
- 38	RC07GF272K	•	RESISTOR, 2700 OHMS 10%, 1/4 W	VO1121						1
			745-0764-00	A2A2R9						
- 39	913-3942-00	•	CAPACITOR, 470 UUF 20%, 500 VDCW	A2A2C52						1
- 40	RC07GF101K	•	RESISTOR, 100 OHMS 10%, 1/4 W	VO1121						1
			745-0713-00	A2A2R10						
- 41	MS16225-1	•	COIL, 0.15 UH	V99800	240-1562-00					1
			A2A2L11							
- 42	PW69V101	•	RESISTOR, 100 OHMS 5%, 3 W	V91637						1
			747-5340-00	A2A2R12						
- 43	MS16225-14	•	COIL, 3.90 UH	V99800	240-1575-00					1
			A2A2L14							
- 44	CM05F101J03	•	CAPACITOR, 100 UUF 5%, 500 VDCW	V53021						1
			912-2816-00	A2A2C31						
- 45	GA5-1UUF0RM 5PCT	•	CAPACITOR, 5.1 UUF 5%, 500 VDCW	V78488						1
			913-2994-00	A2A2C28						



ILLUSTRATED PARTS CATALOG

SECTION IV
FREQUENCY MULTIPLIER
AMPLIFIER

FIG. -ITEM	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
13	- 46	CM05F270J03	.	CAPACITOR, 27 UUF 5%, 500 VDCW	V53021					1
	- 47	RC07GF470K	.	RESISTOR, 47 OHMS 10%, 1/4 W	V01121					1
	- 48	MS16225-14	.	COIL, 3.90 UH	V99800	240-1575-00				1
	- 49	913-3942-00	.	CAPACITOR, 470 UUF 20%, 500 VDCW	A2A2C25					1
	- 50	15CD105X9035 A2	.	CAPACITOR, 1 UUF 10%, 35 VDCW	V56289					1
	- 51	MS16224-11	.	COIL, 3.90 UH	V99800	240-1595-00				1
	- 52	913-3942-00	.	CAPACITOR, 470 UUF 20%, 500 VDCW	A2A2C30					1
	- 53	MS16225-14	.	COIL, 3.90 UH	V99800	240-1575-00				1
	- 54	913-3942-00	.	CAPACITOR, 470 UUF 20%, 500 VDCW	A2A2C32					1
	- 55	RC07GF471K	.	RESISTOR, 470 OHMS 10%, 1/4 W	V01121					1
	- 56	15CD105X9035 A2	.	CAPACITOR, 1 UUF 10%, 35 VDCW	V56289					1
	- 57	PM69V101	.	RESISTOR, 100 OHMS 5%, 3 W	V91637					1
	- 58	MS16224-11	.	COIL, 3.90 UH	V99800	240-1595-00				1
	- 59	913-3942-00	.	CAPACITOR, 470 UUF 20%, 500 VDCW	A2A2C53					1
	- 60	RC07GF390K	.	RESISTOR, 39 OHMS 10%, 1/4 W	V01121					1
	- 61	MS16225-14	.	COIL, 3.90 UH	V99800	240-1575-00				1
	- 62	RC07GF390K	.	RESISTOR, 39 OHMS 10%, 1/4 W	V01121					1
	- 63	PM69V680	.	RESISTOR, 68 OHMS 5%, 3 W	V91637					1
	- 64	913-3942-00	.	CAPACITOR, 470 UUF 20%, 500 VDCW	A2A2C55					1
	- 65	MS16225-14	.	COIL, 3.90 UH	V99800	240-1575-00				1
	- 66	MS16225-9	.	COIL, 1.50 UH	V99800	240-1570-00				1
	- 67	RC20GF222K	.	RESISTOR, 2200 OHMS 10%, 1/2 W	V01121					1
	- 67	RN60D1961F	.	RESISTOR, 1960 OHMS 1%, 1/8 W	V75042					1
	- 67	RN65B1961F	.	RESISTOR, 1960 OHMS 1%, 1/4 W	V75042					1
	- 68	MS16225-3	.	COIL, 0.33 UH	V99800	240-1564-00				1
	- 69	RC07GF104J	.	RESISTOR, 100,000 OHMS 5%, 1/4 W	V01121					1
	- 70	MS16225-3	.	COIL, 0.33 UH	V99800	240-1564-00				1
	- 71	554-2021-005	.	COVER, AMPL MULTIPLIER						1
			.	ATTACHING PARTS						
		MS35216-2	.	SCREW	V77250	343-0123-00				13
		MS35337-77	.	WASHER	V79807	310-0070-00				13
			.	- - * - -						
	- 72	VC21G	.	CAPACITOR, VAR, 0.8 TO 4.5 UUF, 1000 VDCW	V73899	922-0415-00				1
	- 73	VC21G	.	CAPACITOR, VAR, 0.8 TO 4.5 UUF, 1000 VDCW	V73899	922-0415-00				1
	- 74	VC21G	.	CAPACITOR, VAR, 0.8 TO 4.5 UUF, 1000 VDCW	V73899	922-0415-00				1



ILLUSTRATED PARTS CATALOG

FIG. & INDEX NO.	PART NO.	NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
		1 2 3 4 5 6 7		
13	- 73 VC21G	• CAPACITOR, VAR, 0.8 TO 4.5 UUF, 1000 VDCW V73899 922-0415-00 A2A2C6		1
	- 74 VC21G	• CAPACITOR, VAR, 0.8 TO 4.5 UUF, 1000 VDCW V73899 922-0415-00 A2A2C9		1
	- 75 VC21G	• CAPACITOR, VAR, 0.8 TO 4.5 UUF, 1000 VDCW V73899 922-0415-00 A2A2C12		1
	MS35216-1	ATTACHING PARTS FOR 72 THRU 75 • SCREW V77250 343-0122-00		4
	- 76 554-2006-003	• RETAINER, CAPACITOR		4
	- 77 CC22SH120J	• CAPACITOR, 12 UUF 5%, 500 VDCW V72982 928-0351-00 A2A2C1		1
	- 78 CM05F151J03	• CAPACITOR, 150 UUF 5%, 500 VDCW V53021 912-2828-00 A2A2C2		1
	- 79 GA-33UUEPORM 5PCT	• CAPACITOR, 0.33 UUF 5%, 500 VDCW V78488 913-2972-00 A2A2C5		1
	- 80 CC22SH120J	• CAPACITOR, 12 UUF 5%, 500 VDCW V72982 928-0351-00 A2A2C7		1
	- 81 GA-33UUEPORM 5PCT	• CAPACITOR, 0.33 UUF 5%, 500 VDCW V78488 913-2972-00 A2A2C8		1
	- 82 CC22SH120J	• CAPACITOR, 12 UUF 5%, 500 VDCW V72982 928-0351-00 A2A2C10		1
	- 83 GA-33UUEPORM 5PCT	• CAPACITOR, 0.33 UUF 5%, 500 VDCW V78488 913-2972-00 A2A2C11		1
	- 84 CC22SH120J	• CAPACITOR, 12 UUF 5%, 500 VDCW V72982 928-0351-00 A2A2C13		1
	- 85 554-2012-00	• STATOR ASSY		4
	MS35216-2	ATTACHING PARTS • SCREW V77250 343-0123-00		8
	COML	• WASHER 310-0074-00		8
	- 86 554-2233-003	• COIL, R-F A2A2L1		1
	- 87 554-2233-003	• COIL, R-F A2A2L2		1
	- 88 554-2233-003	• COIL, R-F A2A2L3		1
	- 89 554-2233-003	• COIL, R-F A2A2L4		1
	- 90 554-1992-002	• SPACER, TOROID		4
	COML	ATTACHING PARTS FOR 86 THRU 90 • SCREW 330-2084-00		4
	- 91 COML	• NUT 334-0284-00		1
	- 92 554-1981-002	• HOUSING, BRG		1
	- 93 S187-312HHP 15L02	• REARING, BALL, ANNULAR V40920 309-1925-00		1
	- 94 554-1995-003	• SHAFT, AMPL		1
	- 95 554-2001-002	• CONTACT, ELECTRICAL		8
	- 96 553-5021-002	• WASHER		8
	- 97 554-1999-003	• COLLAR, SHAFT		8
	MS51053-402	ATTACHING PARTS • SETSCREW V08664 335-0122-00		16
	- 98 554-2010-003	• ROTOR		4
	- 99 77NM0612ZM3J	• REARING, BALL, ANNULAR V43334 309-1516-00		1
	-100 RC07GF222K	• RESISTOR, 2200 OHMS 10%, 1/4 W V01121 745-0761-00 A2A2R4 EFF THRU MCN 111		1
	-100 RC07GF332K	• RESISTOR, 3300 OHMS 10%, 1/4 W V01121 745-0767-00 A2A2R4 EFF MCN 112		1
	-101 CM05F750J03	• CAPACITOR, 75 UUF 5%, 500 VDCW V53021 912-2807-00 A2A2C14 EFF THRU MCN 111		1
	-101 CM05F121J03	• CAPACITOR, 120 UUF 5%, 500 VDCW V53021 912-2822-00 A2A2C14 EFF MCN 112		1
	-101A 913-3942-00	• CAPACITOR, 470 UUF 20%, 500 VDCW A2A2C61 EFF MCN 112 SR-17		1
	-102 913-3942-00	• CAPACITOR, 470 UUF 20%, 500 VDCW A2A2C16		1



ILLUSTRATED PARTS CATALOG

SECTION IV FREQUENCY MULTIPLIER AMPLIFIER

FIG. & INDEX NO.	PART NO.	NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
		1 2 3 4 5 6 7		
13-	-103	913-3942-00		1
	-104	2N2398		1
	-105	RC07GF471K		1
	-106	CK60AW821M		1
	-107	538011C0P0		1
	89R			
	-108	538011E2P0		1
	94R			
	-108A	763-3069-001		2
	-109	MS16225-2		1
	-110	2N1142		1
	-110	2N1142		1
	-110A	554-6305-002		1
	-111	DE9PC7		1
		68-1660-26		2
		4040-2HOT		1
		TINNED		
		MS35216-3		2
	-112	538011C0P0		1
	92R			
	-113	RC07GF152K		1
	-113A	913-3942-00		1
	-114	CK60AW681M		1
	-115	913-3942-00		1
	-116	DA718-001		1
	-117	DA718-001		1
	-118	M206-1000M		1
	-119	DA718-001		1
	-120	538011C0P0		1
	89R			
	-120A	763-3069-001		2
	-121	MS16225-3		1
	-122	338011C0H0		1
	470J			
	-123	RN60D1963F		1
	-123	RN60D8252F		1
	-124	DELETED		
	-125	RN60D1002F		1
	-125	RN60G1002F		1
	-125	RN60G3012F		1
	-126	MA4561		1
			A2A2CR1	

SECTION IV

FREQUENCY MULTIPLIER
AMPLIFIEROVERHAUL
MANUAL

GROUP ASSEMBLY PARTS LIST

FIG. - ITEM	PART NO.	NOMENCLATURE						USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7	
13		ATTACHING PARTS							
	COML	•	NUT	313-0056-00					1
	COML	•	WASHER	310-0081-00					1
		•	-	*	-	-			
-127	554-6388-002	•	COIL, R-F	A2A2L18					1
-128	554-2231-003	•	TRANSFORMER, R-F	A2A2T2					1
-129	538011C0P0	•	CAPACITOR, VAR, 2 TO 8 UUF, 350 VDCW						1
	89R		V72982	917-1218-00	A2A2C44				
-130	554-6389-002	•	COIL, R-F	A2A2L15					1
-131	M23-500M	•	CAPACITOR, 1500 UUF 20%, 500 VDCW	V53021					1
			912-0667-00	A2A2C42					
-132	538011C0P0	•	CAPACITOR, VAR, 2 TO 8 UUF, 350 VDCW						1
	89R		V72982	917-1218-00	A2A2C41				
-133	CM05F101J03	•	CAPACITOR, 100 UUF 5%, 500 VDCW	V53021					1
			912-2816-00	A2A2C40					
-134	554-6335-002	•	CONTACT, ELECTRICAL						1
		ATTACHING PARTS							
	COML	•	SCREW	343-0286-00					1
	761-0006-003	•	INSULATOR, WASH.						1
	504-8506-002	•	WASHER, INSULATING						1
	COML	•	WASHER	302-0024-00					1
	COML	•	WASHER	310-0054-00					1
		•	-	*	-	-			
-135	2N1692	•	TRANSISTOR	V96214	352-0362-00	A2A2Q7			1
-136	2N1692	•	TRANSISTOR	V96214	352-0362-00	A2A2Q6			1
		ATTACHING PARTS FOR 135 AND 136							
	COML	•	NUT	313-0140-00					2
	COML	•	WASHER	310-0078-00					2
	COML	•	WASHER	310-0055-00					2
		•	-	*	-	-			
-137	MA4561	•	SEMICONDUCTOR DEVICE	V96341	353-3442-00				1
			A2A2CR2						
		ATTACHING PARTS							
	COML	•	NUT	313-0056-00					1
	COML	•	WASHER	310-0081-00					1
		•	-	*	-	-			
-138	M23-500M	•	CAPACITOR, 1500 UUF 20%, 500 VDCW	V53021					1
			912-0667-00	A2A2C39					
-139	554-6390-003	•	TRANSFORMER, R-F	A2A2T1					1
		ATTACHING PARTS							
	COML	•	SCREW	343-0285-00					1
	COML	•	WASHER	302-0024-00					1
	COML	•	WASHER	310-0054-00					1
		•	-	*	-	-			
-140	538011C0P0	•	CAPACITOR, VAR, 2 TO 8 UUF, 350 VDCW						1
	89R		V72982	917-1218-00	A2A2C33				
-141	RC07GF470K	•	RESISTOR, 47 OHMS 10%, 1/4 W	V01121					1
			745-0701-00	A2A2R22					
-142	538011C0P0	•	CAPACITOR, VAR, 2 TO 8 UUF, 350 VDCW						1
	89R		V72982	917-1218-00	A2A2C37				
-143	M23-500M	•	CAPACITOR, 1500 UUF 20%, 500 VDCW	V53021					1
			912-0667-00	A2A2C38					
-144	538011F2P0	•	CAPACITOR, VAR, 9 TO 35 UUF, 200 VDCW						1
	94R		V72982	917-1225-00	A2A2C36				
-145	CM05F101J03	•	CAPACITOR, 100 UUF 5%, 500 VDCW	V53021					1
			912-2816-00	A2A2C34					
-146	913-3942-00	•	CAPACITOR, 470 UUF 20%, 500 VDCW	A2A2C35					1
-147	554-6387-002	•	COIL, R-F	A2A2L24	EFF THRU MCN 1840				1
-147	538011C0P092	•	CAPACITOR, 5.5 TO 18 UUF, 350 VDCW	V72982					1
	R		917-1222-00	A2A2C56	EFF MCN 1841				
-148	538011F2P0	•	CAPACITOR, VAR, 9 TO 35 UUF, 200 VDCW						1
	94R		V72982	917-1225-00	A2A2C36				

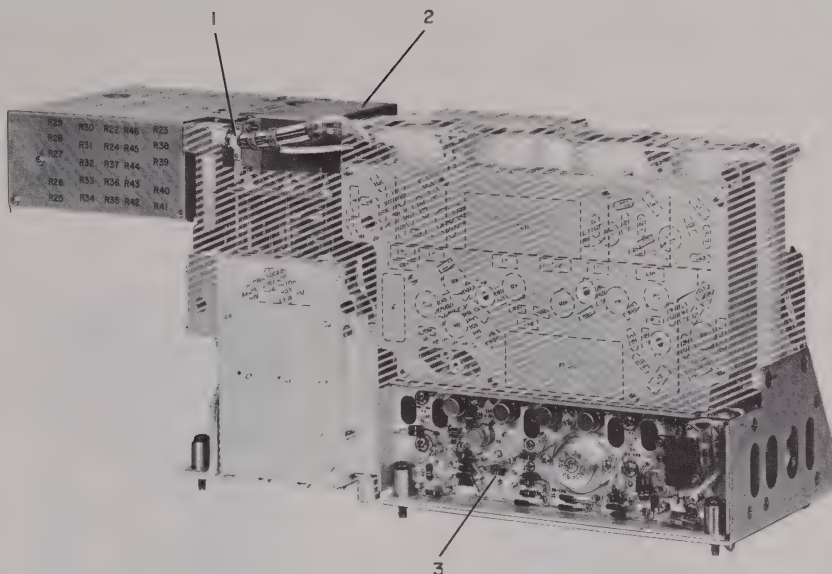
July 1/66



ILLUSTRATED PARTS CATALOG

SECTION IV FREQUENCY MULTIPLIER AMPLIFIER

FIG. & INDEX NO.	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
13	-149	2N1692	•	TRANSISTOR	V96214	352-0362-00	A2A2Q5			1
			•	ATTACHING PARTS						
		COML	•	NUT	313-0140-00					1
		COML	•	WASHER	310-0078-00					1
		COML	•	WASHER	310-0055-00					1
			•	- * - -						
	-150	MS16225-4	•	COIL, 0.47 UH	V99800	240-1565-00	A2A2L27			1
	-151	538011E2P0	•	CAPACITOR, VAR, 9 TO 35 UUF, 200 VDCW						1
		94R	•	V72982	917-1225-00	A2A2C56	EFF THRU MCN 1840			
	-151	538011COP092	•	CAPACITOR, 5.5 TO 18 UUF, 350 VDCW	V72982					1
		R	•	917-1222-00	A2A2C56	EFF MCN 1841				
	-152	554-2226-002	•	COIL, R-F	A2A2L12					1
	-153	538011E2P0	•	CAPACITOR, VAR, 9 TO 35 UUF, 200 VDCW						1
		94R	•	V72982	917-1225-00	A2A2C29				
	-153A	763-3069-001	•	INSULATOR, CAPACITOR						5
		94R	•	V72982	917-1225-00	A2A2C29				
	-154	2N1142	•	TRANSISTOR	V96214	352-0162-00	A2A2Q3			1
			•	EFF THRU MCN 3126						
	-154	2N1142	•	TRANSISTOR	352-0162-020	A2A2Q3				1
			•	EFF MCN 3127						
	-154A	545-7544-003	•	WASHER	EFF MCN 112					1
	-154R	554-6305-002	•	INSULATOR, TSTP	EFF MCN 112					1
	-155	TXR2P032-037	•	HOLDER, SEMICONDUCTOR	V98978	352-9885-00				1
		-3								
	-156	2N1692	•	TRANSISTOR	V96214	352-0362-00	A2A2Q4			1
			•	ATTACHING PARTS						
		COML	•	NUT	313-0140-00					1
		COML	•	WASHER	310-0078-00					1
		COML	•	WASHER	310-0055-00					1
			•	- * - -						
	-157	554-2020-005	•	CHASSIS, ELECTRICAL EQUIP.						1
	-158	5348	•	COVER, ELECTRICAL CONN	V98291	357-7025-00				1
			•	ATTACHING PARTS						
		MS16535-133	•	RIVET	V12014	305-1788-00				1
			•	- * - -						
	-159	554-6331-002	•	CONNECTOR, ELECTRICAL	A2A2J4					1
	-160	554-2105-002	•	CONNECTOR, ELECTRICAL	A2A2J1					1
	-161	554-1987-002	•	PIN, LOCATING						2
	-162	100-245	•	HOLDER, TSTR	V99378	139-2443-00				1
			•	ATTACHING PARTS						
		MS16535-11	•	RIVET	V12014	305-1710-00				1
			•	- * - -						
	-163	SL275-197D	•	TERMINAL, EFFDTHRU	V12615	306-1521-00				13
		WHT								
	-164	SS5169	•	TERMINAL, STUD	V86577	306-0983-00				1
	-165		•	DELETED						
	-166	SL286-301D	•	TERMINAL, EFFDTHRU	V12615	306-1331-00				23
		WHT								
	-167	SL356-314WHT	•	TERMINAL, EFFDTHRU	V12615	306-2326-00				10
	-168	SL278-198D	•	TERMINAL, STANDOFF	V12615	306-1819-00				14
	-169	554-1968-005	•	CHASSIS, ELECTRICAL EQUIP.						1
14	-	554-1632-00	•	CHANNEL SELECTOR	A2A1	SEE FIG. 9-18				RF
			•	FOR NHA						
	- 1	554-6384-002	•	CLAMP, CABLE						1
			•	ATTACHING PARTS						
		MS35216-2	•	SCREW	V77250	343-0123-00				1
		MS35337-77	•	WASHER	V79807	310-0070-00				1
			•	- * - -						
	- 2	554-1634-00	•	MECHANICAL DRIVE	SEE FIG. 15					1
	- 3	554-2023-00	•	CHANNELING ELECTRONICS						1
	- 4	1N2610	•	SEMICONDUCTOR DEVICE	V03508					1
			•	353-1905-00	A2A1CR12					



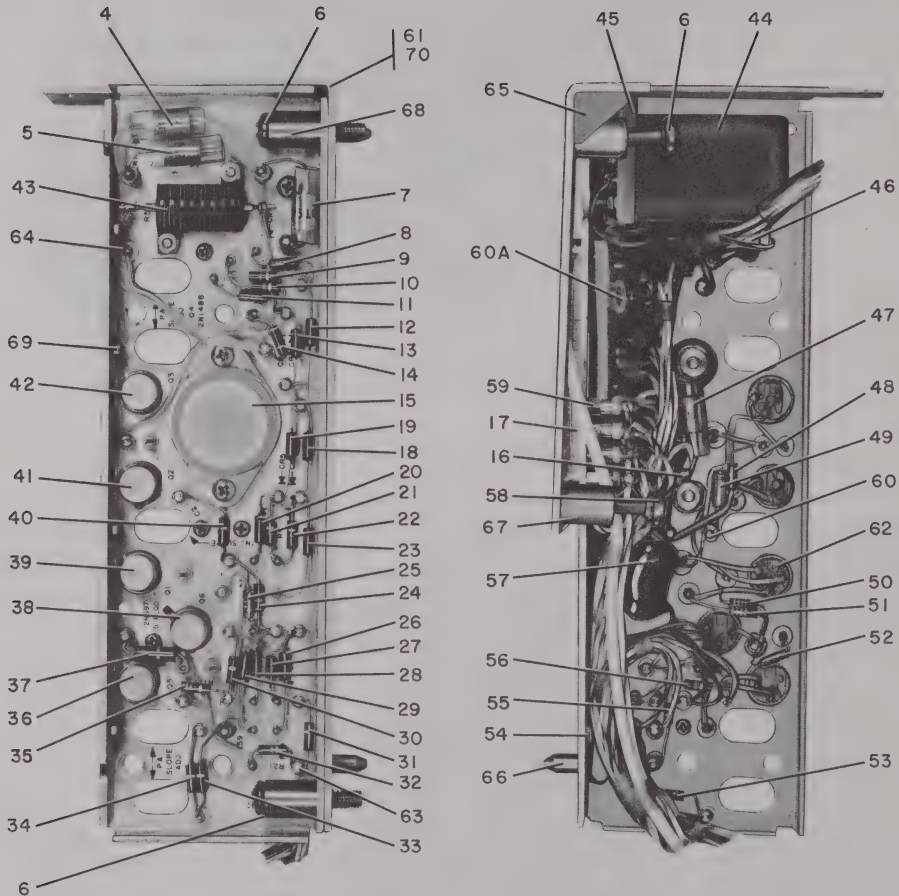
Channel Selector (Sheet 1 of 2)
Figure 14

FIG. -ITEM		PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
			1	2	3	4	5	6	7		
14	- 5	1N2610	• •	SEMICONDUCTOR DEVICE	V03508						1
			• •	353-1905-00	A2A1CR11						
	- 6	554-2091-004	• •	SCREW, MACH.							3
			• •	ATTACHING PARTS							
		340-0642-00	• •	SLEEVE, SPG							3
			• •	* - - -							
	- 7	1N2610	• •	SEMICONDUCTOR DEVICE	V03508						1
			• •	353-1905-00	A2A1CR13						
	- 8	1N458	• •	SEMICONDUCTOR DEVICE	V03508						1
			• •	353-0205-00	A2A1CR18						
	- 9	RC07GF223K	• •	RESISTOR, 22,000 OHMS 10%, 1/4 W	V01121						1
			• •	745-0797-00	A2A1R10						
	- 10	RC07GF223K	• •	RESISTOR, 22,000 OHMS 10%, 1/4 W	V01121						1
			• •	745-0797-00	A2A1R8						
	- 11	1N458	• •	SEMICONDUCTOR DEVICE	V03508						1
			• •	353-0205-00	A2A1CR16						
	- 12	1N458	• •	SEMICONDUCTOR DEVICE	V03508						1
			• •	353-0205-00	A2A1CR8						
	- 13	1N458	• •	SEMICONDUCTOR DEVICE	V03508						1
			• •	353-0205-00	A2A1CR6						
	- 14	RC07GF470K	• •	RESISTOR, 47 OHMS 10%, 1/4 W	V01121						1
			• •	745-0701-00	A2A1R7						
	- 15	2N1488	• •	TRANSISTOR	V96214	352-0466-00	A2A1Q4				1
	- 16	4007-4HOT TINNED	• •	TERMINAL, LUG	V77147	304-0015-00					1
			• •	ATTACHING PARTS FOR 15 AND 16							
		COML	• •	NUT	313-0132-00						2



ILLUSTRATED PARTS CATALOG

SECTION IV
CHANNEL SELECTOR



Channel Selector (Sheet 2 of 2)
Figure 14



ILLUSTRATED PARTS CATALOG

FIG. -ITEM	PART NO.	NOMENCLATURE						USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6		
14	MS35338-78	•	•	WASHER	V79807	310-0279-00			2
	COML	•	•	WASHER	310-0054-00				2
	302-2300-00	•	•	INSULATOR, WASH.					2
	554-2050-002	•	•	INSULATOR, BUSH.					2
	COML	•	•	SCREW	343-0288-00				2
		-	-	* - -					
- 17	DC37PC7	•	•	CONNECTOR, RECP	V91146	371-0171-00			1
				A2A1P1					
				ATTACHING PARTS					
	68NM26	•	•	NUT, SELF-LKG, HFX.	V72962	333-0327-00			2
	MS35200-4	•	•	SCREW	V77250	342-0134-00			2
		-	-	* - -					
- 18	1N458	•	•	SEMICONDUCTOR DEVICE	V03508				1
				353-0205-00	A2A1CR7				
- 19	1N458	•	•	SEMICONDUCTOR DEVICE	V03508				1
				353-0205-00	A2A1CR5				
- 20	1N458	•	•	SEMICONDUCTOR DEVICE	V03508				1
				353-0205-00	A2A1CR15				
- 21	RC07GF223K	•	•	RESISTOR, 22,000 OHMS 10%, 1/4 W	V01121				1
				745-0797-00	A2A1R9				
- 22	RC07GF223K	•	•	RESISTOR, 22,000 OHMS 10%, 1/4 W	V01121				1
				745-0797-00	A2A1R11				
- 23	1N458	•	•	SEMICONDUCTOR DEVICE	V03508				1
				353-0205-00	A2A1CR17				
- 24	RC07GF473K	•	•	RESISTOR, 47,000 OHMS 10%, 1/4 W	V01121				1
				745-0809-00	A2A1R1				
- 25	1N270	•	•	SEMICONDUCTOR DEVICE	V03508				1
				353-2018-00	A2A1CR14				
- 26	1N458	•	•	SEMICONDUCTOR DEVICE	V03508				1
				353-0205-00	A2A1CR4				
- 27	1N458	•	•	SEMICONDUCTOR DEVICE	V03508				1
				353-0205-00	A2A1CR3				
- 28	1N458	•	•	SEMICONDUCTOR DEVICE	V03508				1
				353-0205-00	A2A1CR2				
- 29	1N458	•	•	SEMICONDUCTOR DEVICE	V03508				1
				353-0205-00	A2A1CR1				
- 30	RC07GF222K	•	•	RESISTOR, 2200 OHMS 10%, 1/4 W	V01121				1
				745-0761-00	A2A1R19				
- 31	RC07GF821K	•	•	RESISTOR, 820 OHMS 10%, 1/4 W	V01121				1
				745-0746-00	A2A1R20				
- 32	RC07GF273K	•	•	RESISTOR, 27,000 OHMS 10%, 1/4 W	V01121				1
				745-0800-00	A2A1R21				
- 33	RC07GF222K	•	•	RESISTOR, 2200 OHMS 10%, 1/4 W	V01121				1
				745-0761-00	A2A1R2				
- 34	RC07GF102K	•	•	RESISTOR, 1000 OHMS 10%, 1/4 W	V01121				1
				745-0749-00	A2A1R14				
- 35	RC07GF332K	•	•	RESISTOR, 3300 OHMS 10%, 1/4 W	V01121				1
				745-0767-00	A2A1R17				
- 36	2N697	•	•	TRANSISTOR	V96214	352-0197-00	A2A1Q5		1
- 37	PC20GF182K	•	•	RESISTOR, 1800 OHMS 10%, 1/2 W	V01121				1
				745-1363-00	A2A1R16				
- 38	2N697	•	•	TRANSISTOR	V96214	352-0197-00	A2A1Q6		1
- 39	2N697	•	•	TRANSISTOR	V96214	352-0197-00	A2A1Q1		1
- 40	RC07GF222K	•	•	RESISTOR, 2200 OHMS 10%, 1/4 W	V01121				1
				745-0761-00	A2A1R4				
- 41	2N697	•	•	TRANSISTOR	V96214	352-0197-00	A2A1Q2		1
- 42	2N697	•	•	TRANSISTOR	V96214	352-0197-00	A2A1Q3		1
- 43	RE65G1820	•	•	RESISTOR, 182 OHMS 1%, 10 W	V91637				1
				747-8555-00	A2A1R5				
				ATTACHING PARTS					
	COML	•	•	NUT	313-0050-00				2



ILLUSTRATED PARTS CATALOG

SECTION IV
CHANNEL SELECTOR

FIG. -ITEM	PART NO.	NOMENCLATURE						USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6 7		
14	MS35338-77	•	•	WASHER	V79807	310-0275-00			2
	MS35200-4	•	•	SCREW	V77250	342-0134-00			2
		-	-	* - -					
- 44	A11593	•	•	TRANSFORMER, PWR	V70674	672-1423-00			1
				A2A1T3					
	COML	•	•	ATTACHING PARTS					
	MS35338-78	•	•	NUT	313-0132-00				2
		•	•	WASHER	V79807	310-0279-00			2
		-	-	* - -					
- 45	554-2024-002	•	•	PLATE, MTG, XMFR					1
				ATTACHING PARTS					
	MS35216-12	•	•	SCREW	V77250	343-0133-00			1
	MS35200-12	•	•	SCREW	V77250	342-0044-00			2
	MS35338-78	•	•	WASHER	V79807	310-0279-00			1
		-	-	* - -					
- 46	1N2610	•	•	SEMICONDUCTOR DEVICE	V03508				1
				353-1905-00	A2A1CR10				
- 47	1N2610	•	•	SEMICONDUCTOR DEVICE	V03508				1
				353-1905-00	A2A1CR9				
- 48	RC07GF102K	•	•	RESISTOR, 1000 OHMS 10%, 1/4 W	V01121				1
				745-0749-00	A2A1R6				
- 49	KR047J35S	•	•	CAPACITOR, 47,000 UUF 10%, 35 VDCW					1
				V05397	184-7393-00	A2A1C2			
- 50	RC07GF103K	•	•	RESISTOR, 10,000 OHMS 10%, 1/4 W	V01121				1
				745-0785-00	A2A1R3				
- 51	RC07GF333K	•	•	RESISTOR, 33,000 OHMS 10%, 1/4 W	V01121				1
				745-0803-00	A2A1R2				
- 52	1N746A	•	•	SEMICONDUCTOR DEVICE, ZENER DIO, 3.3 V					1
				5% V03508	353-2938-00	A2A1CR21			
- 53	RC07GF471K	•	•	RESISTOR, 470 OHMS 10%, 1/4 W	V01121				1
				745-0737-00	A2A1R13				
- 54	541-5179-002	•	•	BUTTON, CARLE					1
				ATTACHING PARTS					
	MS35200-12	•	•	SCREW	V77250	342-0044-00			1
		-	-	* - -					
- 55	RC07GF104K	•	•	RESISTOR, 100,000 OHMS 10%, 1/4 W					1
				V01121	745-0821-00	A2A1R59			
- 56	RC07GF103K	•	•	RESISTOR, 10,000 OHMS 10%, 1/4 W	V01121				1
				745-0785-00	A2A1R18				
- 57	DM20F432J300	•	•	CAPACITOR, 4300 UUF 5%, 300 VDCW	V72136				1
	WV			912-3363-00	A2A1C1				
- 58	MS35216-44	•	•	SCREW	V77250	343-0191-00			1
				ATTACHING PARTS					
	340-0642-00	•	•	SLEEVE, SPG					1
		-	-	* - -					
- 59	G4777-10	•	•	TERMINAL, STUD	V12615	306-1018-00			7
- 60	A8396-1	•	•	TERMINAL, STUD	V12615	306-1281-00			5
				ATTACHING PARTS FOR 59 AND 60					
	MS35200-2	•	•	SCREW	V77250	342-0132-00			6
	MS35216-2	•	•	SCREW	V77250	343-0123-00			6
		-	-	* - -					
- 60A	403	•	•	TERMINAL, LUG	V79963	304-1089-00			1
				ATTACHING PARTS					
	COML	•	•	NUT	313-0132-00				1
	MS35338-78	•	•	WASHER	V79807	310-0279-00			1
	MS35200-12	•	•	SCREW	V77250	342-0044-00			1
		-	-	* - -					
- 61	554-2029-005	•	•	CHASSIS, ELECTRICAL EQUIP.					1
- 62	05-3307-51	•	•	SOCKET, TSTP	V91662	352-9903-00			5
				A2A1XQ1 THRU A2A1XQ5					



ILLUSTRATED PARTS CATALOG

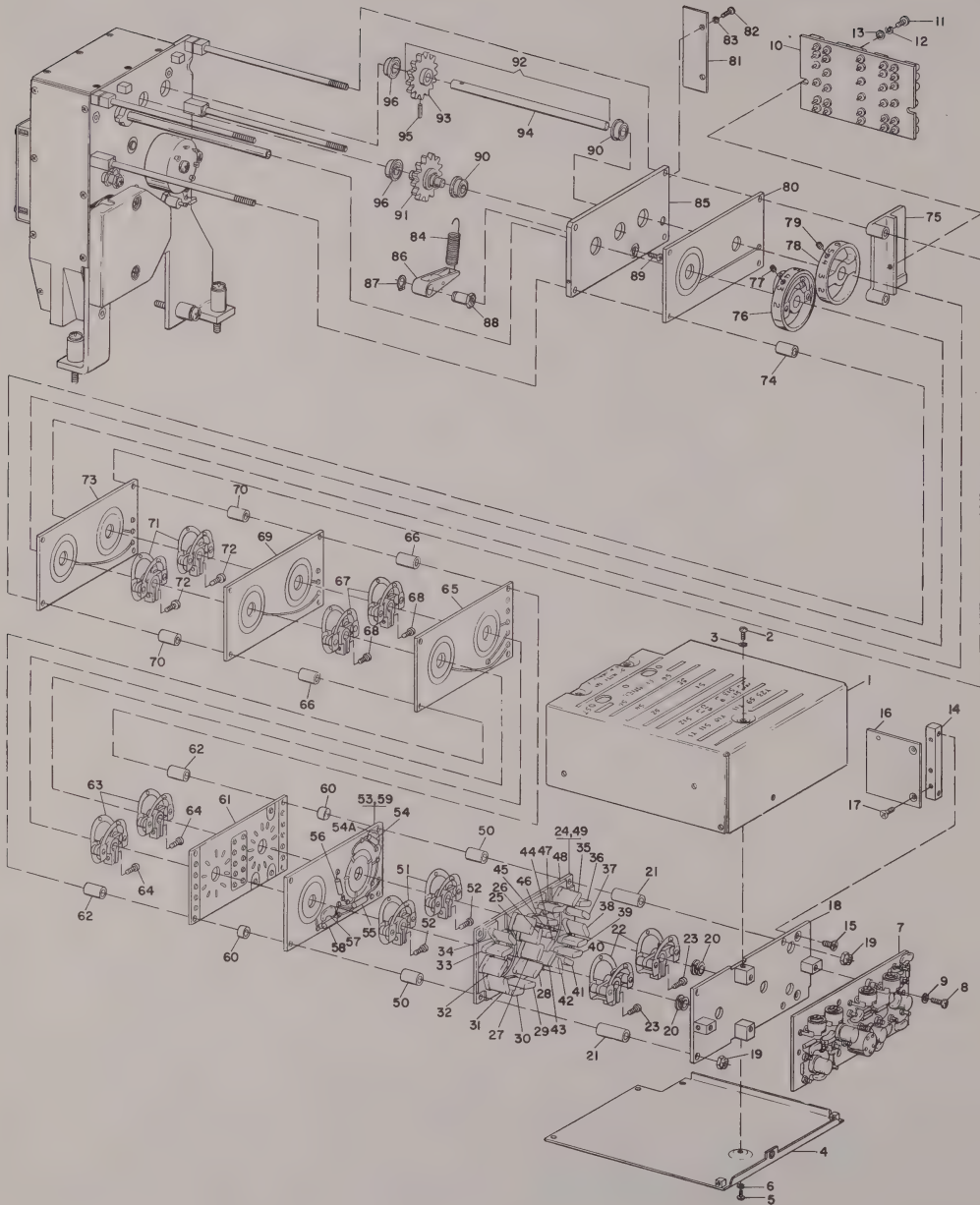
FIG. -ITEM	PART NO.	NOMENCLATURE						USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6		
14		ATTACHING PARTS							
	A7575	.	.	.	RETAINER, TSTR SOC	V91662			5
					352-9904-00				
		-	-	*	-				
- 63	SL275-127D	.	.	.	TERMINAL, FEEDTHRU	V12615			15
	WHT				306-1521-00				
- 64	SL286-301D	.	.	.	TERMINAL, FEEDTHRU	V12615			25
	WHT				306-1331-00				
- 65	554-6313-003	.	.	.	BRACKET, CORNER				1
		ATTACHING PARTS							
	MS35200-22	.	.	.	SCREW	V77250 342-0059-00			1
		-	-	*	-				
- 66	540-7767-002	.	.	.	PIN, LOCATING				2
- 67	554-2025-002	.	.	.	BUSHING, CAPTIVE SCR				1
- 68	554-1641-002	.	.	.	BUSHING, CAPTIVE SCR				2
- 69	F22NCFMA2-40	.	.	.	NUT, SELF-LKG, CLINCH	V72962			4
					333-0840-00				
- 70	554-2028-005	.	.	.	CHASSIS, ELECTRICAL EQUIP.				1
15	554-1634-00	MECHANICAL DRIVE SEE FIG. 14-2 FOR NHA							REF
- 1	554-1765-004	.	.	.	COVER, TOP				1
		ATTACHING PARTS							
- 2	MS35216-2	.	.	.	SCREW	V77250 343-0123-00			10
- 3	MS35338-77	.	.	.	WASHER	V79807 310-0275-00			10
		-	-	*	-				
- 4	554-1763-004	.	.	.	COVER, BOTTOM				1
		ATTACHING PARTS							
- 5	MS35216-2	.	.	.	SCREW	V77250 343-0123-00			4
- 6	MS35338-77	.	.	.	WASHER	V79807 310-0275-00			4
		-	-	*	-				
- 7	554-2269-004	.	.	.	OSCILLATOR SUBASSEMBLY	SEE FIG. 16			1
		ATTACHING PARTS							
- 8	MS35216-11	.	.	.	SCREW	V77250 343-0132-00			4
- 9	MS35338-78	.	.	.	WASHER	V79807 310-0279-00			4
		-	-	*	-				
- 10	554-1728-003	.	.	.	RESISTOR ASSY	SEE FIG. 17			1
		ATTACHING PARTS							
- 11	MS35216-12	.	.	.	SCREW	V77250 343-0133-00	EFF THRU		2
					MCN 111				
- 11	COML	.	.	.	SCREW	347-0006-00	EFF MCN 112		5
- 12	MS35338-78	.	.	.	WASHER	V79807 310-0279-00			2
- 13	502-1515-002	.	.	.	WASHER, FLAT				2
		-	-	*	-				
- 14	554-1711-002	.	.	.	BLOCK, SUPPORT				1
		ATTACHING PARTS							
- 15	MS35200-12	.	.	.	SCREW	V77250 342-0044-00			2
		-	-	*	-				
- 16	554-6321-002	.	.	.	TERMINAL BOARD				1
		ATTACHING PARTS							
- 17	MS35200-1	.	.	.	SCREW	V77250 342-0131-00			2
		-	-	*	-				
- 18	554-1743-004	.	.	.	PRINTED CIRCUIT BOARD	A2A1TPB			1
		ATTACHING PARTS							
- 19	68-1660-40	.	.	.	NUT, SELF-LKG, HEX.	V72962 333-0605-00			4
		-	-	*	-				
- 20	3L2FF	.	.	.	BEARING, SLV	V96881 309-0795-00			2
- 21	554-1736-003	.	.	.	SPACER, SLV				4
- 22	554-1705-002	.	.	.	CONTACT ASSY, ELECTRICAL				2
		ATTACHING PARTS							
- 23	324-0672-00	.	.	.	SCREW, CAP, SCH				2
		-	-	*	-				



ILLUSTRATED PARTS CATALOG

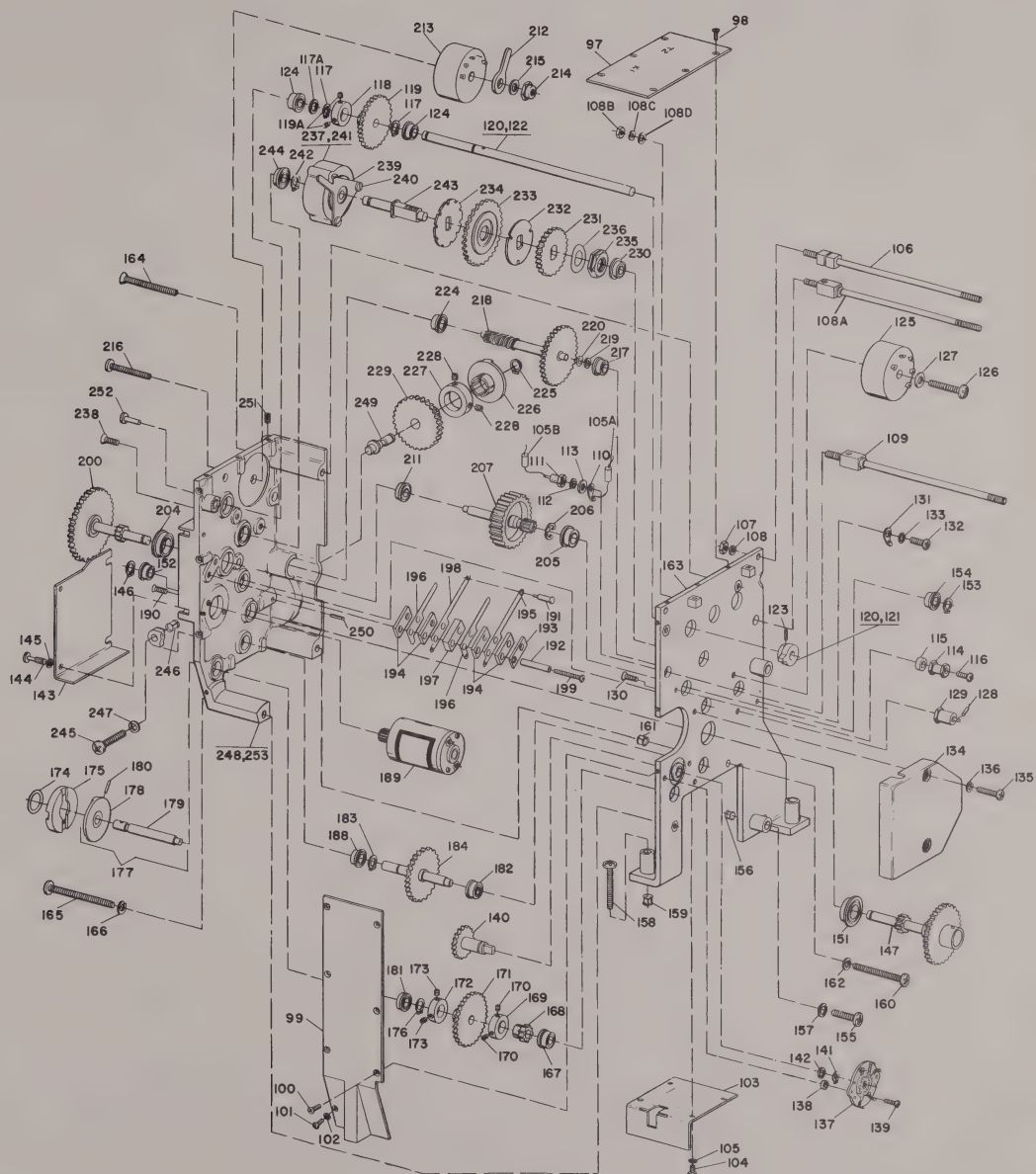
SECTION IV

MECHANICAL DRIVE



Mechanical Drive (Sheet 1 of 2)
Figure 15

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Mechanical Drive (Sheet 2 of 2)
Figure 15



ILLUSTRATED PARTS CATALOG

SECTION IV
MECHANICAL DRIVE

FIG.-ITEM	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
15	- 24	554-1738-003	•	CRYSTAL ASSY						1
	- 25	M0-7949	•	CRYSTAL UNIT, QTZ	V85675	290-7949-00				1
				A2A1Y10						
	- 26	M0-7948	•	CRYSTAL UNIT, QTZ	V85675	290-7948-00				1
				A2A1Y9						
	- 27	M0-7947	•	CRYSTAL UNIT, QTZ	V85675	290-7947-00				1
				A2A1Y8						
	- 28	M0-7946	•	CRYSTAL UNIT, QTZ	V85675	290-7946-00				1
				A2A1Y7						
	- 29	M0-7945	•	CRYSTAL UNIT, QTZ	V85675	290-7945-00				1
				A2A1Y6						
	- 30	M0-7944	•	CRYSTAL UNIT, QTZ	V85675	290-7944-00				1
				A2A1Y5						
	- 31	M0-7943	•	CRYSTAL UNIT, QTZ	V85675	290-7943-00				1
				A2A1Y4						
	- 32	M0-7942	•	CRYSTAL UNIT, QTZ	V85675	290-7942-00				1
				A2A1Y3						
	- 33	M0-7941	•	CRYSTAL UNIT, QTZ	V85675	290-7941-00				1
				A2A1Y2						
	- 34	M0-7940	•	CRYSTAL UNIT, QTZ	V85675	290-7940-00				1
				A2A1Y1						
	- 35	CR76U37-8037	•	CRYSTAL UNIT, QTZ	V85675	289-0307-00				1
		OMC		A2A1Y23						
	- 36	CR76U37-3870	•	CRYSTAL UNIT, QTZ	V85675	289-0306-00				1
		OMC		A2A1Y22						
	- 37	CR76U36-9704	•	CRYSTAL UNIT, QTZ	V85675	289-0305-00				1
		OMC		A2A1Y21						
	- 38	CR76U36-5537	•	CRYSTAL UNIT, QTZ	V85675	289-0304-00				1
		OMC		A2A1Y20						
	- 39	CR76U36-1370	•	CRYSTAL UNIT, QTZ	V85675	289-0303-00				1
		OMC		A2A1Y19						
	- 40	CR76U35-7204	•	CRYSTAL UNIT, QTZ	V85675	289-0302-00				1
		OMC		A2A1Y18						
	- 41	CR76U35-3037	•	CRYSTAL UNIT, QTZ	V85675	289-0301-00				1
		OMC		A2A1Y17						
	- 42	CR76U34-8870	•	CRYSTAL UNIT, QTZ	V85675	289-0300-00				1
		OMC		A2A1Y16						
	- 43	CR76U34-4704	•	CRYSTAL UNIT, QTZ	V85675	289-0299-00				1
		OMC		A2A1Y15						
	- 44	CR76U34-0537	•	CRYSTAL UNIT, QTZ	V85675	289-0298-00				1
		OMC		A2A1Y14						
	- 45	CR76U33-6370	•	CRYSTAL UNIT, QTZ	V85675	289-0297-00				1
		OMC		A2A1Y13						
	- 46	CR76U33-2204	•	CRYSTAL UNIT, QTZ	V85675	289-0296-00				1
		OMC		A2A1Y12						
	- 47	CR76U32-8037	•	CRYSTAL UNIT, QTZ	V85675	289-0295-00				1
		OMC		A2A1Y11						
	- 48	554-1748-004	•	INSULATOR, PLATE						1
	- 49	554-1767-005	•	PRINTED CIRCUIT BOARD	A2A1Y7					1
	- 50	554-1735-003	•	SPACER, SLV						4
	- 51	554-1704-002	•	CONTACT ASSY, ELECTRICAL						2
				ATTACHING PARTS						
	- 52	324-0672-00	•	SCREW, CAP, SCH						2
				- - * - -						

SECTION IV

MECHANICAL DRIVE

ILLUSTRATED PARTS
CATALOG

FIG. - ITEM	PART NO.	NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
		1 2 3 4 5 6 7		
15	- 53	554-2267-002 . SWITCH SUBASSEMBLY		1
	- 54	MS16225-1 . . COIL, 0.15 UH V99800 240-1562-00		1
		A2A1L2		
	- 54A	CK60AW102M . . CAPACITOR, 1000 UUF 20%, 1000 VDCW		1
		V01939 013-1186-00 A2A1C20 FFF		
		MCN 112		
	- 55	MS16225-1 . . COIL, 0.15 UH V99800 240-1562-00		1
		A2A1L3		
	- 56	MS16225-1 . . COIL, 0.15 UH V99800 240-1562-00		1
		A2A1L4		
	- 57	DM15F510J03 . . CAPACITOR, 51 UUF 5%, 300 VDCW V72126		1
		912-2867-00 A2A1C15		
	- 58	MS16225-7 . . COIL, 1 UH V99800 240-1568-00 A2A1L1		1
	- 59	554-1745-004 . . PRINTED CIRCUIT BOARD A2A1TB6		1
	- 60	554-1734-003 . SPACER, SLV		4
	- 61	554-1758-004 . PRINTED CIRCUIT BOARD A2A1TB5		1
	- 62	554-1735-003 . SPACER, SLV		4
	- 63	554-1704-002 . CONTACT ASSY, ELECTRICAL		2
		ATTACHING PARTS		
	- 64	324-0672-00 . SCREW, CAP, SCH		2
		- - * - -		
	- 65	554-1756-004 . PRINTED CIRCUIT BOARD A2A1TB4		1
	- 66	554-1735-003 . SPACER, SLV		4
	- 67	554-1704-002 . CONTACT ASSY, ELECTRICAL		2
		ATTACHING PARTS		
	- 68	324-0672-00 . SCREW, CAP, SCH		2
		- - * - -		
	- 69	554-1754-004 . PRINTED CIRCUIT BOARD A2A1TB3		1
	- 70	554-1735-003 . SPACER, SLV		4
	- 71	554-1704-002 . CONTACT ASSY, ELECTRICAL		2
		ATTACHING PARTS		
	- 72	324-0672-00 . SCREW, CAP, SCH		2
		- - * - -		
	- 73	554-1752-004 . PRINTED CIRCUIT BOARD A2A1TB2		1
	- 74	554-1735-003 . SPACER, SLV		2
	- 75	554-1726-004 . BLOCK, SPACER		1
	- 76	554-1732-003 . DIAL		1
		ATTACHING PARTS		
	- 77	MS51053-402 . SETSCREW V08664 335-0122-00		2
		- - * - -		
	- 78	554-1707-002 . DIAL		1
		ATTACHING PARTS		
	- 79	MS51053-402 . SETSCREW V08664 335-0122-00		2
		- - * - -		
	- 80	554-1750-004 . PRINTED CIRCUIT BOARD A2A1TB1		1
	- 81	554-1708-002 . COVER, DETENT		1
		ATTACHING PARTS		
	- 82	MS35216-2 . SCREW V77250 343-0123-00		2
	- 83	MS35338-77 . WASHER V79807 310-0275-00		2
		- - * - -		
	- 84	554-1696-002 . SPRING, HELICAL, EXTENSION		1
	- 85	554-1727-003 . PLATE, GEAR		1
	- 86	554-1741-003 . ARM, DETENT		1
		ATTACHING PARTS		
	- 87	MS16624-15 . RING, RETAINING V89462 340-0023-00		1
		- - * - -		



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FIG. - ITEM	PART NO.	NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
		1 2 3 4 5 6 7		
15 - 88	554-1702-002	. NUT, SLV ATTACHING PARTS		1
- 89	MS35216-13	. SCREW V77250 343-0134-00 - * - -		1
- 90	SFR166PPK 25-7	. BEARING, BALL, ANNULAR V83086 309-1797-00		2
- 91	554-1702-002	. GEAR, GENEVA, 13 TEETH		1
- 92	554-1706-002	. GEARSHAFT, SPUR		1
- 93	554-1693-002	. . GEAR, SPUR, 13 TEETH DRILL ON INSTALLATION		1
- 94	554-1698-002	. . SHAFT, STRAIGHT DRILL ON INSTALLATION ATTACHING PARTS FOR 93 AND 94		1
- 95	MS16562-191	. . PIN V72962 311-0418-00 - * - -		1
- 96	SFR166PPK 25-7	. BEARING, BALL, ANNULAR V83086 308-1797-00		2
- 97	554-1649-002	. COVER, TOP ATTACHING PARTS		1
- 98	MS35200-2	. SCREW V77250 342-0132-00 - * - -		6
- 99	554-2208-003	. COVER, SIDE ATTACHING PARTS		1
-100	MS35200-2	. SCREW V77250 342-0132-00		6
-101	MS35216-2	. SCREW V77250 343-0123-00		1
-102	MS35338-77	. WASHER V79807 310-0275-00 - * - -		1
-103	554-2212-003	. COVER, BOTTOM ATTACHING PARTS		1
-104	MS35216-2	. SCREW V77250 343-0123-00		4
-105	MS35338-77	. WASHER V79807 310-0275-00 - * - -		4
-105A	1N648	. SEMICONDUCTOR DEVICE V03508 353-2609-00 A2A1CR23 EFF MCN 1244 SR-23		1
-105B	PC076F470K	. RESISTOR, 47 OHMS 10%, 1/4 W V01121 745-0701-00 A2A1R62 EFF MCN 1244 SR-23		1
-106	554-1712-002	. POST, TOP ATTACHING PARTS		2
-107	COML	. NUT 313-0132-00		2
-108	MS35338-78	. WASHER V79807 310-0279-00 - * - -		2
-108A	554-1713-002	. POST, BOTTOM ATTACHING PARTS		1
-108B	COML	. NUT 313-0132-00		1
-108C	MS35338-78	. WASHER V79807 310-0279-00		1
-108D	541-1215-002	. WASHER, FLAT - * - -		1
-109	554-1713-002	. POST, BOTTOM		1
-110	4007-4HOT TINNED	. TERMINAL, LUG V77147 304-0015-00		1
-111	COML	. NUT 313-0132-00 EFF THRU MCN 1243 SR-23		1
-111	RTM12M	. TERMINAL, STUD V91663 306-0976-00 EFF MCN 1244 SR-23		1
-112	MS35338-78	. WASHER V79807 310-0279-00		1
-113	541-1215-002	. WASHER, FLAT EFF THRU MCN 1243 SR-23 - * - -		1

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MECHANICAL DRIVE

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FIG. - ITEM	PART NO.	NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
		1 2 3 4 5 6 7		
15	-114	541-5177-002		1
	-115	553-5111-002		1
		• BUTTON, CARLE		
		• WASHER		
		ATTACHING PARTS FOR 114 AND 115		
	-116	MS35216-15		1
		• SCREW V77250 243-0136-00		
		- - * - -		
	-117	MS16624-18		2
	-117A	554-8773-003		AR
		• RING, RETAINING V89462 340-0004-00		
		• WASHER EFF MCN 112		
	-118	554-1656-002		1
		• COLLAR, SHAFT		
	-119	554-1652-002		1
		• GEAR, SPUR, 48 TEETH		
		ATTACHING PARTS FOR 118 AND 119		
	-119A	MS51053-426		2
		• SETSCREW VCR664 335-0003-00		
		- - * - -		
	-120	554-2216-002		1
	-121	554-1692-002		1
	-122	554-2215-002		1
		• SHAFT, SWITCHING UNIT		
		• PINION, GENEVA DRILL ON INSTALLATION		
		• SHAFT, STRAIGHT DRILL ON INSTALLATION		
		ATTACHING PARTS FOR 121 AND 122		
	-123	MS16562-191		1
		• PIN V72962 311-0418-00		
		- - * - -		
	-124	SFR166PPK		2
		25-7		
		• BEARING, BALL, ANNULAR V830R6		
		309-1797-00		
	-125	94-0567-00		1
		• TRANSFORMER, PWR V95105 662-0805-00		
		A2A1T1		
		ATTACHING PARTS		
	-126	MS35216-29		1
		• SCREW V77250 343-0174-00		
	-127	COML		1
		• WASHER 310-0046-00		
		- - * - -		
	-128	1N747A		1
		• SEMICONDUCTOR DEVICE, ZENER DIO, 3.6 V 10%		
		V03508 353-2702-00 A2A1CR19		
	-129	RTMT12M		1
		• TERMINAL, STUD V91663 306-0976-00		
		ATTACHING PARTS		
	-130	MS35200-12		1
		• SCREW V77250 342-0044-00		
		- - * - -		
	-131	4040-2HOT		1
		TINNED		
		ATTACHING PARTS		
	-132	MS35216-2		1
		• SCREW V77250 343-0123-00		
	-133	MS35338-77		1
		• WASHER V79807 310-0275-00		
		- - * - -		
	-134	554-1683-003		1
		• COVER, GEAR		
		ATTACHING PARTS		
	-135	COML		2
		• SCREW 330-1021-00		
	-136	MS35336-78		2
		• WASHER V79807 310-0279-00		
		- - * - -		
	-137	231376AA		1
		• SWITCH SECTION, ROT. V76854 269-2464-00		
		A2A1S8 EFF THRU MCN 1397		
	-137	269-2614-00		1
		• SWITCH SECTION, ROT. A2A1S8 EFF MCN		
		1398 SP-26		
	-138	554-2144-002		2
		• SPACER, SLV EFF THRU MCN 1397		
	-138	541-5949-002		2
		• SPACER, SLV EFF MCN 1398		
		ATTACHING PARTS		
	-139	MS35216-4		2
		• SCREW V77250 243-0125-00 EFF THRU		
		MCN 1397		
	-139	MS35216-5		2
		• SCREW V77250 243-0126-00 EFF MCN 1398		
		- - * - -		



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MECHANICAL DRIVE

FIG. - ITEM	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
15	-140	554-1654-00	.	GEARSHAFT, SPUR, 30 TEETH						1
			.	ATTACHING PARTS						
	-141	MS16624-1R	.	RING, RETAINING V89462	340-0004-00					1
	-142	553-5028-003	.	WASHER						1
			-	* - -						
	-143	554-2213-003	.	COVER, GEAR						1
			.	ATTACHING PARTS						
	-144	COML	.	SCREW 330-1021-00						2
	-145	MS35338-79	.	WASHER V79807	310-0279-00					2
			-	* - -						
	-146	MS16624-1R	.	RING, RETAINING V89462	340-0004-00					1
	-147	554-2211-003	.	GEARSHAFT, SPUR, 78 TEETH						1
	-148		.	DELETED						
	-149		.	DELETED						
	-150		.	DELETED						
	-151	SFR1810PPK	.	BEARING, BALL, ANNULAR V83086						1
		25-7	.	309-1798-00						
	-152	S5632FCHHP25	.	BEARING, BALL, ANNULAR V40920						1
		L01	.	309-1800-00						
	-153	MS16624-1R	.	RING, RETAINING V89462	340-0004-00					1
	-154	S5632FCHHP25	.	BEARING, BALL, ANNULAR V40920						1
		L01	.	309-1800-00						
	-155	MS35216-27	.	SCREW V77250	343-0171-00					2
			.	ATTACHING PARTS						
	-156	340-0641-00	.	SLEEVE, SPG						2
	-157	MS35338-79	.	WASHER V79807	310-0282-00					2
			-	* - -						
	-158	MS35216-4F	.	SCREW V77250	343-0192-00					2
			.	ATTACHING PARTS						
	-159	340-0642-00	.	SLEEVE, SPG						2
			-	* - -						
	-160	COML	.	SCREW 343-0510-00						1
			.	ATTACHING PARTS						
	-161	340-0641-00	.	SLEEVE, SPG						1
	-162	MS35338-79	.	WASHER V79807	310-0282-00					1
			-	* - -						
	-163	554-2219-005	.	PLATE, GEAR						1
			.	ATTACHING PARTS						
	-164	MS35200-33	.	SCREW V77250	342-0072-00					1
	-165	MS35216-33	.	SCREW V77250	343-0180-00					2
	-166	MS35338-79	.	WASHER V79807	310-0282-00					2
			-	* - -						
	-167	SFR155PPK	.	BEARING, BALL, ANNULAR V83086						1
		25-7	.	309-1796-00						
	-168	554-1650-002	.	GEAR, SPUR, 15 TEETH						1
	-169	554-1656-002	.	COLLAR, SHAFT						1
			.	ATTACHING PARTS FOR 168 AND 169						
	-170	MS51053-426	.	SETSCREW V08664	335-0003-00					2
			-	* - -						
	-171	554-1644-002	.	GEAR, SPUR, 48 TEETH						1
	-172	554-1656-002	.	COLLAR, SHAFT						1
			.	ATTACHING PARTS FOR 171 AND 172						
	-173	MS51053-426	.	SETSCREW V08664	335-0003-00					2
			-	* - -						

ILLUSTRATED PARTS
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FIG. - ITEM	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
15	-174	213-141216-00-2303	• RING, PLASTIC	V78189	150-0062-00					1
	-175	544-8060-002	• INSERT, FLEX. COUPLING							1
	-176	MS16624-18	• RING, RETAINING	V89462	340-0004-00					1
	-177	554-1686-003	• SHAFT, DRIVER EXCITER							1
	-178	546-9086-002	• COUPLING, SHAFT, FLEX.	DRILL ON						1
			INSTALLATION							
	-179	554-1653-002	• SHAFT, SHOULDERED	DRILL ON						1
			INSTALLATION							
			ATTACHING PARTS FOR 178 AND 179							
	-180	MS16562-192	• PIN	V72962	311-0419-00					1
			- - * - -							
	-181	S5632FCHHP25 L01	• BEARING, BALL, ANNULAR	V40920						1
			309-1800-00							
	-182	SFR155PPK 25-7	• BEARING, BALL, ANNULAR	V83086						1
			309-1796-00							
	-183	MS16624-18	• RING, RETAINING	V89462	340-0004-00					1
	-184	554-1660-002	• GEARSHAFT, SPUR, 48 TEETH							1
	-185		DELETED							
	-186		DELETED							
	-187		DELETED							
	-188	S5632FCHHP25 L01	• BEARING, BALL, ANNULAR	V40920						1
			309-1800-00							
R	-189	41A245	• D-C MOTOR	V25140	230-0338-00	A2A1R1				1
			ATTACHING PARTS							
	-190	MS35200-5	• SCREW	V77250	342-0135-00					2
			- - * - -							
	-191	542-4593-002	• PIN, SHOULDER							1
	-192	554-1655-002	• INSULATOR, SLV							2
	-193	542-4597-002	• PLATE, RETAINING							1
	-194	542-4598-002	• INSULATOR, PLATE							4
	-195	546-5208-002	• ARM, CONT							1
	-196	546-5187-002	• ARM, CONT							2
	-197	542-4596-002	• INSULATOR, PLATE							1
	-198	546-5207-002	• ARM, CONT							1
			ATTACHING PARTS FOR 192 THRU 198							
	-199	MS35216-8	• SCREW	V77250	343-0005-00					2
			- - * - -							
	-200	554-2210-003	• GEARSHAFT, SPUR, 96 TEETH							1
	-201		DELETED							
	-202		DELETED							
	-203		DELETED							
	-204	SFR1810PPK 25-7	• BEARING, BALL, ANNULAR	V83086						1
			309-1798-00							
	-205	SFR168PPK 25-7	• BEARING, BALL, ANNULAR	V83086						1
			309-1799-00							
	-206	MS16632-1025	• RING, RETAINING	V89462	340-0114-00					1
	-207	554-1673-003	• GEARSHAFT, SPUR, 48 TEETH							1
	-208		DELETED							
	-209		DELETED							
	-210		DELETED							
	-211	SFR155PPK 25-7	• BEARING, BALL, ANNULAR	V83086						1
			309-1796-00							



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FIG. & INDEX NO.	PART NO.	NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
		1 2 3 4 5 6 7		
15	-212	554-2207-003 . RETAINER, XMFR		1
	-213	94-0567-00 . TRANSFORMER, PWR V95105 662-0905-00 A2A1T2		1
		ATTACHING PARTS FOR 212 AND 213		
	-214	MS20365D632A . NUT, SELF-LKG, HEX. V72962 333-0368-00		1
	-215	COML . WASHER 310-0046-00		1
	-216	MS35216-31 . SCREW V77250 343-0176-00 - - * - -		1
	-217	SFR155PPK . BEARING, BALL, ANNULAR V83086 25-7 309-1796-00		1
	-218	554-1671-003 . WORM GEAR ASSY ATTACHING PARTS		1
	-219	553-5034-003 . WASHER		AR
	-220	553-5035-003 . WASHER - - * - -		AR
	-221	DELETED		
	-222	DELETED		
	-223	DELETED		
	-224	SFR155PPK . BEARING, BALL, ANNULAR V83086 25-7 309-1796-00		1
	-225	MS16624-18 . RING, RETAINING V89462 340-0004-00		1
	-226	554-1637-002 . COUPLING SHAFT, HALF		1
	-227	554-1638-002 . COLLAR, SHAFT ATTACHING PARTS FOR 226 AND 227		1
	-228	MS51053-426 . SETSCREW V08664 335-0003-00 - - * - -		2
	-229	554-1666-003 . GEAR, WORM, 52 TEETH		1
	-230	SFR166PPK . BEARING, BALL, ANNULAR V83086 25-7 309-1797-00		1
	-230A	544-8773-003 . WASHER		AR
	-231	554-1648-002 . GEAR, SPUR, 48 TEETH		1
	-232	757-1020-001 . DISK		1
	-233	554-1685-003 . GEAR, SPUR, 61 TEETH		1
	-234	546-2726-002 . WHEEL ATTACHING PARTS FOR 231 THRU 234		1
	-235	544-4795-002 . NUT, PLAIN, HEX.		1
	-235A	544-4796-002 . WASHER, KEY		1
	-236	546-5174-002 . WASHER, SPG - - * - -		1
	-237	542-6735-003P . SOLENOID ASSY A2A1K1 ATTACHING PARTS		1
	-238	MS35200-13 . SCREW V77250 342-0045-00 - - * - -		3
	-239	546-2215-002 . PAWL ASSY ATTACHING PARTS		1
	-240	542-4510-002 . SCREW, PIVOT - - * - -		2
	-241	546-8922-003 . COIL, SOL.		1
	-242	MS16624-18 . RING, RETAINING V89462 340-0004-00		1
	-243	554-2217-004 . SHAFT, SHOULDERED		1
	-244	SFR166PPK . BEARING, BALL, ANNULAR V83086 25-7 309-1797-00		1
	-245	MS35216-28 . SCREW V77250 343-0173-00 ATTACHING PARTS		1
	-246	340-0641-00 . SLEEVE, SPG		1
	-247	MS35338-79 . WASHER V79807 310-0282-00 - - * - -		1
	-248	554-2214-003 . PLATE, GFAR		1
	-249	554-1636-002 . SHAFT, SHOULDERED ATTACHING PARTS		1
	-250	MS16562-193 . PIN V72962 311-0420-00 - - * - -		1



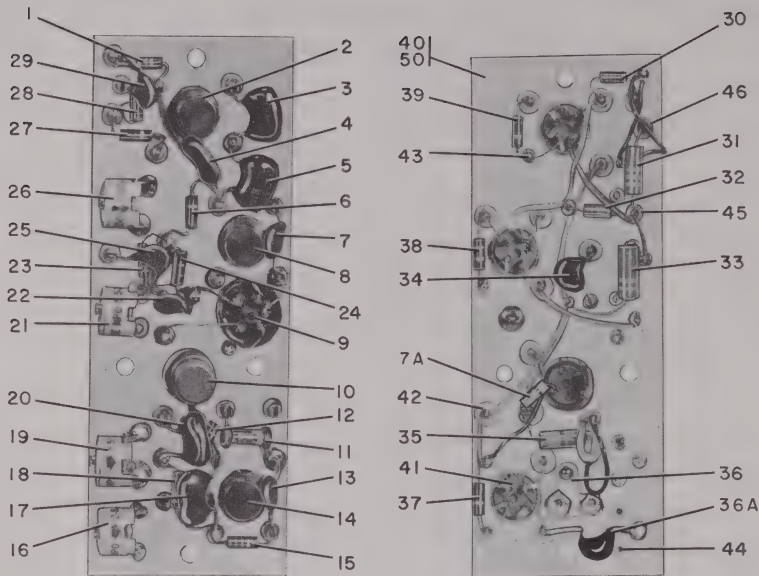
ILLUSTRATED PARTS CATALOG

FIG. & INDEX NO.	PART NO.	NOMENCLATURE						USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6		
15	-251 MS122118	•	•	•	•	•	•		2
	-252 554-2240-002	•	•	•	•	•	•		2
	-253 554-1829-005	•	•	•	•	•	•		1
		•	•	•	•	•	•		
16	-	554-2269-004	OSCILLATOR SUBASSEMBLY	SEE FIG. 15-7					REF
	-	1	RC07GF393K	•	RESISTOR, 39,000 OHMS 10%, 1/4 W	V01121			1
				•	745-0806-00 A2A1R51				
	-	2	2N2367	•	TRANSISTOR V96214	352-0407-00 A2A10R			1
	-	3	CM05F101J03	•	CAPACITOR, 100 UUF 5%, 500 VDCW	V53021			1
				•	912-2816-00 A2A1C9				
	-	4	CM05F101J03	•	CAPACITOR, 100 UUF 5%, 500 VDCW	V53021			1
				•	912-2816-00 A2A1C7				
	-	5	CM05F331J03	•	CAPACITOR, 330 UUF 5%, 500 VDCW	V53021			1
				•	912-2852-00 A2A1C8				
	-	6	RC07GF820K	•	RESISTOR, 82 OHMS 10%, 1/4 W	V01121			1
				•	745-0710-00 A2A1R56				
	-	7	CK60AW102M	•	CAPACITOR, 1000 UUF 20%, 1000 VDCW	V01939			1
				•	913-1186-00 A2A1C13				
	-	7A	RC07GF121K	•	RESISTOR, 120 OHMS 10%, 1/4 W	V01121			1
				•	745-0716-00 A2A1R61				
	-	8	2N2360	•	TRANSISTOR V96214	352-0465-00 A2A1Q9			1
	-	9	01-901	•	TRANSFORMER, R-F V06978	278-1854-00 A2A1T4			1
			COML	•	ATTACHING PARTS				
				•	SCREW 343-0286-00				1
				•	- - * - -				
	-	10	FSP161	•	SEMICONDUCTOR DEVICE V07263	353-3443-00			1
				•	A2A1CR20				
	-	11	CC20CH180J	•	CAPACITOR, 18 UUF 5%, 500 VDCW	V91984			1
				•	916-0674-00 A2A1C5				
	-	12	RC07GF562K	•	RESISTOR, 5600 OHMS 10%, 1/4 W	V01121			1
				•	745-0776-00 A2A1R49				
	-	13	CK60AW102M	•	CAPACITOR, 1000 UUF 20%, 1000 VDCW	V01939			1
				•	913-1186-00 A2A1C6				
	-	14	2N2362	•	TRANSISTOR V96214	352-0407-00 A2A107			1
	-	15	RC07GF333K	•	RESISTOR, 33,000 OHMS 10%, 1/4 W	V01121			1
				•	745-0803-00 A2A1R48				
	-	16	917-1208-00	•	CAPACITOR, VAR, 2 TO 8 UUF, 350 VDCW				1
				•	A2A1C3				
	-	17	CM05F101J03	•	CAPACITOR, 100 UUF 5%, 500 VDCW	V53021			1
				•	912-2816-00 A2A1C4				
	-	18	RC07GF393K	•	RESISTOR, 39,000 OHMS 10%, 1/4 W	V01121			1
				•	745-0806-00 A2A1R47				
	-	19	917-1212-00	•	CAPACITOR, VAR, 5.5 TO 18 UUF, 350 VDCW				1
				•	A2A1C19				
	-	20	CM05F221J03	•	CAPACITOR, 220 UUF 5%, 500 VDCW	V53021			1
				•	912-2840-00 A2A1C16				
	-	21	917-1212-00	•	CAPACITOR, VAR, 5.5 TO 18 UUF, 350 VDCW				1
				•	A2A1C17				
	-	22	CK60AW102M	•	CAPACITOR, 1000 UUF 20%, 1000 VDCW	V01939			1
				•	913-1186-00 A2A1C12				
	-	23	RC07GF222K	•	RESISTOR, 2200 OHMS 10%, 1/4 W	V01121			1
				•	745-0761-00 A2A1R57				
	-	24	RC07GF272K	•	RESISTOR, 2700 OHMS 10%, 1/4 W	V01121			1
				•	745-0764-00 A2A1R55				
	-	25	CK60AW102M	•	CAPACITOR, 1000 UUF 20%, 1000 VDCW	V01939			1
				•	913-1186-00 A2A1C14				
	-	26	917-1215-00	•	CAPACITOR, VAR, 9 TO 35 UUF, 200 VDCW				1
				•	A2A1C10				
	-	27	RC07GF221K	•	RESISTOR, 220 OHMS 10%, 1/4 W	V01121			1
				•	745-0725-00 A2A1R54				



ILLUSTRATED PARTS CATALOG

SECTION IV OSCILLATOR SUBASSEMBLY



Oscillator Subassembly
Figure 16

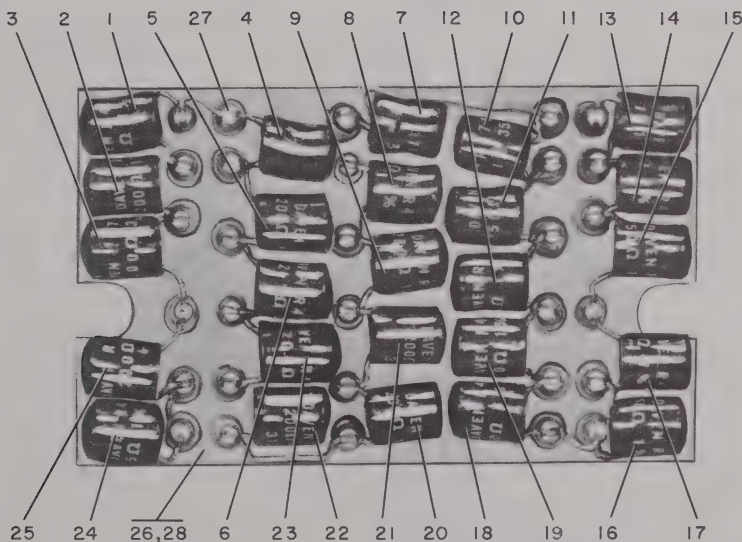
FIG. - ITEM	PART NO.	NOMENCLATURE						USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6		
16	- 28 RC07GF333K	•	RESISTOR, 33,000 OHMS 10%, 1/4 W	V01121					1
			745-0803-00 A2A1R52						
	- 29 CK60AW102M	•	CAPACITOR, 1000 UUF 20%, 1000 VDCW	V01939					1
			913-1186-00 A2A1C18						
	- 30 RC07GF220K	•	RESISTOR, 22 OHMS 10%, 1/4 W	V01121					1
			745-0689-00 A2A1R60						
	- 31 MS16225-11	•	COIL, 2.20 UH	V99800	240-1572-00	A2A1L6			1
	- 32 MS16225-5	•	COIL, 0.68 UH	V99800	240-1566-00	A2A1L7			1
	- 33 MS16225-17	•	COIL, 6.80 UH	V99800	240-1578-00	A2A1L5			1
	- 34 CK60AW102M	•	CAPACITOR, 1000 UUF 20%, 1000 VDCW	V01939					1
			913-1186-00 A2A1C11						
	- 35 MS16225-5	•	COIL, 0.68 UH	V99800	240-1566-00	A2A1L8			1
	- 36 554-6318-002	•	ARM, CONT						1
			ATTACHING PARTS						
	MS35216-2	•	SCREW	V77250	343-0123-00				2
	MS35338-77	•	WASHER	V79807	310-0275-00				2
			- - * - -						
	- 36A CK60AW102M	•	CAPACITOR, 1000 UUF 20%, 1000 VDCW	V01939					1
			913-1186-00 A2A1C21	EFF MCN 112					
	- 37 RC07GF221K	•	RESISTOR, 220 OHMS 10%, 1/4 W	V01121					1
			745-0725-00 A2A1R50						
	- 38 RC07GF392K	•	RESISTOR, 3900 OHMS 10%, 1/4 W	V01121					1
			745-0770-00 A2A1R58						

OSCILLATOR SUBASSEMBLY



ILLUSTRATED PARTS CATALOG

FIG. - ITEM	PART NO.	NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
		1 2 3 4 5 6 7		
16 - 39	RC07GF392K	• RESISTOR, 3900 OHMS 10%, 1/4 W V01121 745-0770-00 A2A1R53		1
- 40	554-1760-004	• PRINTED CIRCUIT BOARD		1
- 41	05-3307-01	• • SOCKET, TSTR V91662 352-9902-00 A2A1XQ7 THRU A2A1XQ9, A2A1XCR20 ATTACHING PARTS		4
	A7575	• • RETAINER, TSTR SOC V91662 352-9904-00 - - * - -		4
- 42	SL295-315	• • TERMINAL, STANDOFF V12615 306-1264-00		3
- 43	3PP4-66A	• • TERMINAL, FEEDTHRU V86577 306-0953-00		6
- 44	542-4091-002	• • TERMINAL, STUD		6
- 45	RFTSM78SL	• • TERMINAL, FEEDTHRU V98291 306-1829-00		6
- 46	SL286-301D	• • TERMINAL, FEEDTHRU V12615 306-1331-00		17
	WHT			
- 47		DELETED		
- 48		DELETED		
- 49		DELETED		
- 50	554-1759-004	• • PRINTED CIRCUIT BOARD A2A1TB9		1



Resistor Assembly

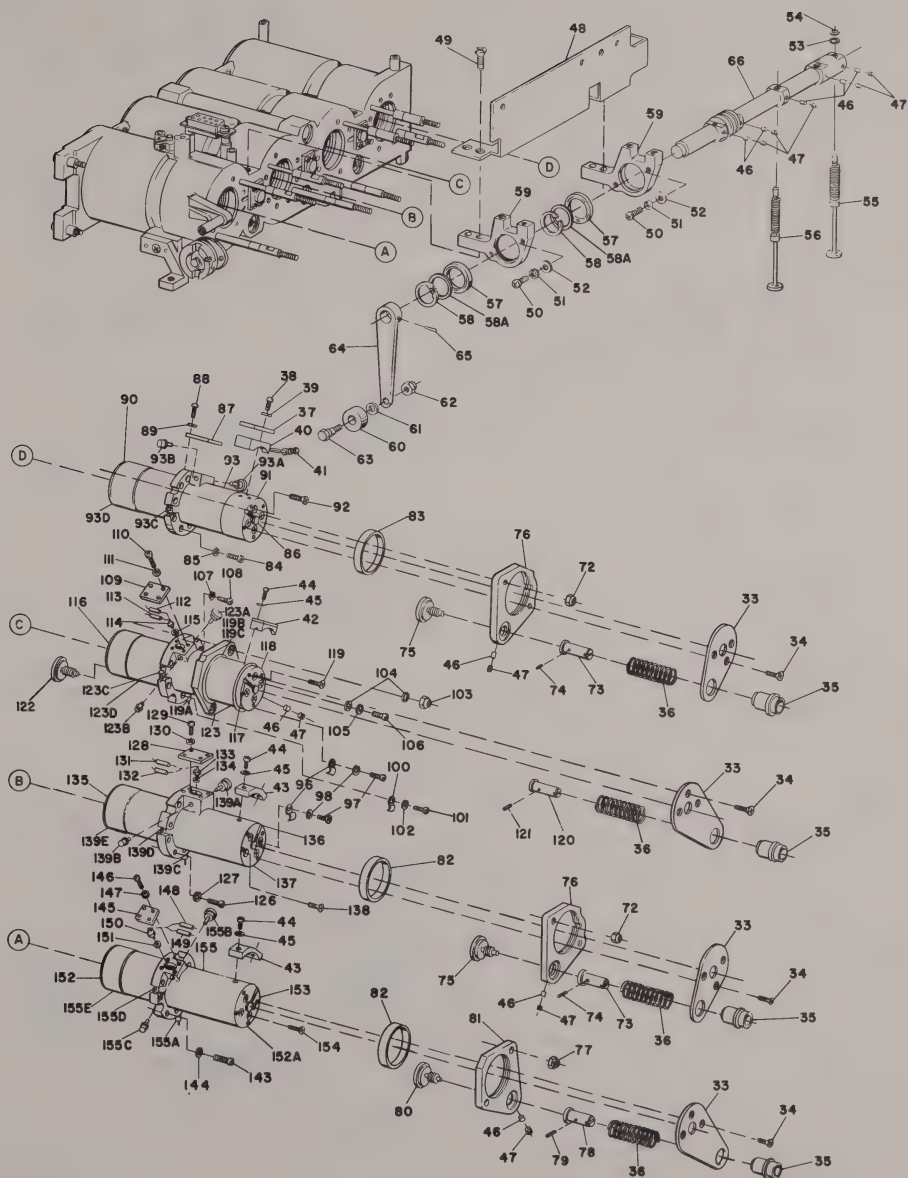
Figure 17



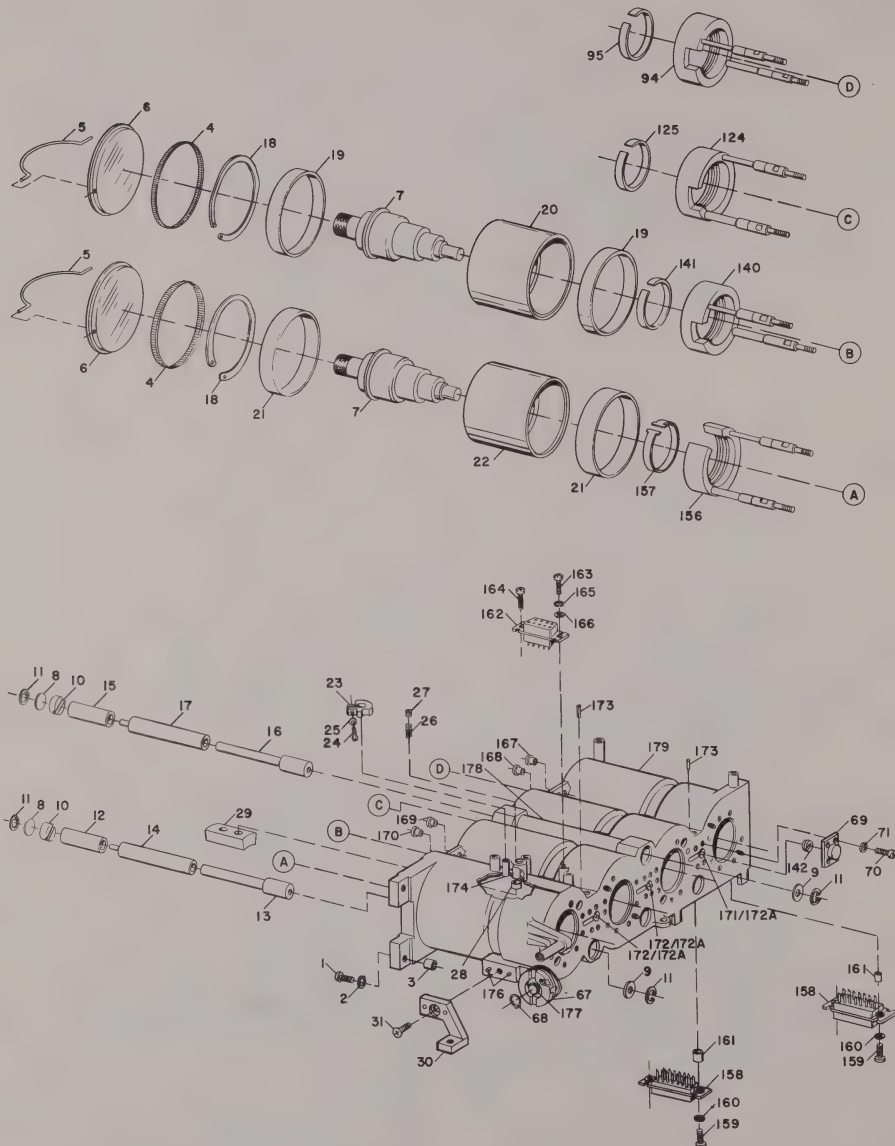
ILLUSTRATED PARTS CATALOG

SECTION IV
RESISTOR ASSEMBLY

FIG. - ITEM		PART NO.	NOMENCLATURE										USAGE CODE	UNITS PER ASSY.	
			1	2	3	4	5	6	7						
17	-	554-1728-002	RESISTOR ASSY SEE FIG. 15-10 FOR NHA											REF	
	- 1	R471-63	. RESISTOR, 200 OHMS 1%, 1/4 W V15909 748-9097-00 A2A1R29											1	
	- 2	R471-63	. RESISTOR, 200 OHMS 1%, 1/4 W V15909 748-9097-00 A2A1R28											1	
	- 3	R471-63	. RESISTOR, 200 OHMS 1%, 1/4 W V15909 748-9097-00 A2A1R27											1	
	- 4	R471-63	. RESISTOR, 200 OHMS 1%, 1/4 W V15909 748-9097-00 A2A1R30											1	
	- 5	R471-63	. RESISTOR, 200 OHMS 1%, 1/4 W V15909 748-9097-00 A2A1R31											1	
	- 6	R471-63	. RESISTOR, 200 OHMS 1%, 1/4 W V15909 748-9097-00 A2A1R32											1	
	- 7	R471-61	. RESISTOR, 111 OHMS 1%, 1/4 W V15909 748-9095-00 A2A1R23											1	
	- 8	R471-62	. RESISTOR, 185 OHMS 1%, 1/4 W V15909 748-9096-00 A2A1R24											1	
	- 9	R471-63	. RESISTOR, 200 OHMS 1%, 1/4 W V15909 748-9097-00 A2A1R37											1	
	- 10	R471-64	. RESISTOR, 250 OHMS 1%, 1/4 W V15909 748-9098-00 A2A1R38											1	
	- 11	R471-64	. RESISTOR, 250 OHMS 1%, 1/4 W V15909 748-9098-00 A2A1R39											1	
	- 12	R471-64	. RESISTOR, 250 OHMS 1%, 1/4 W V15909 748-9098-00 A2A1R40											1	
	- 13	R471-61	. RESISTOR, 111 OHMS 1%, 1/4 W V15909 748-9095-00 A2A1R22											1	
	- 14	R471-64	. RESISTOR, 250 OHMS 1%, 1/4 W V15909 748-9098-00 A2A1R46											1	
	- 15	R471-64	. RESISTOR, 250 OHMS 1%, 1/4 W V15909 748-9098-00 A2A1R45											1	
	- 16	R471-64	. RESISTOR, 250 OHMS 1%, 1/4 W V15909 748-9098-00 A2A1R43											1	
	- 17	R471-64	. RESISTOR, 250 OHMS 1%, 1/4 W V15909 748-9098-00 A2A1R44											1	
	- 18	R471-64	. RESISTOR, 250 OHMS 1%, 1/4 W V15909 748-9098-00 A2A1R42											1	
	- 19	R471-64	. RESISTOR, 250 OHMS 1%, 1/4 W V15909 748-9098-00 A2A1R41											1	
	- 20	R471-63	. RESISTOR, 200 OHMS 1%, 1/4 W V15909 748-9097-00 A2A1R35											1	
	- 21	R471-63	. RESISTOR, 200 OHMS 1%, 1/4 W V15909 748-9097-00 A2A1R36											1	
	- 22	R471-63	. RESISTOR, 200 OHMS 1%, 1/4 W V15909 748-9097-00 A2A1R34											1	
	- 23	R471-63	. RESISTOR, 200 OHMS 1%, 1/4 W V15909 748-9097-00 A2A1R33											1	
	- 24	R471-62	. RESISTOR, 185 OHMS 1%, 1/4 W V15909 748-9096-00 A2A1R25											1	
	- 25	R471-63	. RESISTOR, 200 OHMS 1%, 1/4 W V15909 748-9097-00 A2A1R26											1	
	- 26	554-1730-003	. TERMINAL BOARD A2A1TR10											1	
	- 27	SL286-301D WHT	. . TERMINAL, FFFDTHRU V12615 306-1321-00											30	
- 28	554-1729-003	. . TERMINAL BOARD											1		
18	-	554-1628-00	R-F AMPLIFIER A2A3 SEE FIG. 9-21 FOR NHA											REF	
	- 1	COML	. SCREW 343-0172-00 ATTACHING PARTS											2	
	- 2	MS35337-79	. WASHER V79807 310-0071-00											2	
	- 3	340-0641-00	. SLEFVF, SPG											2	
- - * - -															



R-F Amplifier (Sheet 1 of 2)
Figure 18



R-F Amplifier (Sheet 2 of 2)
Figure 18



FIG. - ITEM	PART NO.	NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
		1 2 3 4 5 6 7		
18	553-4775-002	• CAP		4
- 4	553-4774-002	• • FINGER, CONT		1
- 5	553-4801-003	• • HANDLE, BAIL		1
- 6	553-4802-003	• • RING, CAP		1
- 7	ML7815	• ELECTRON TUBE V37480 256-0152-00 A2A3V1 THRU A2A3V4		4
- 8	554-1853-002	• CAP, ELECTRICAL		4
- 9	554-1854-002	• CAP, ELECTRICAL FFF THRU MCN 121		4
- 9	554-6309-002	• CAP, ELECTRICAL FFF MCN 122		4
- 10	554-1855-002	• INSULATOR, DISK		4
		ATTACHING PARTS FOR 8 THRU 10		
- 11	N5001-43C	• RING, RETAINING V70136 340-1012-00 - - * - -		8
- 12	554-1859-002	• INSULATOR		2
- 13	554-1917-003	• INSULATOR, LG		2
- 14	554-1915-003	• CHOKE, R-F		2
- 15	554-1858-002	• INSULATOR		1
- 16	554-1916-003	• INSULATOR, LG		1
- 17	554-1914-003	• CHOKE, R-F		1
- 18	554-1837-002	• RING, RETAINING		4
- 19	554-1866-002	• SPACER, INSULATING		6
- 20	554-1919-003	• PLATE, CAPACITOR		2
- 21	554-1865-002	• SPACER, INSULATING		2
- 22	554-1921-003	• PLATE, CAPACITOR		1
- 23	554-1868-002	• CLAMP, LOOP		1
		ATTACHING PARTS		
- 24	324-0681-00	• SCREW, CAP, SCH		1
- 25	COML	• WASHER 310-0276-00 - - * - -		1
- 26	554-1892-002	• SPRING, HELICAL, COMPRESSION		1
		ATTACHING PARTS		
- 27	COML	• SETSCREW 335-0010-00		1
- 28	554-1890-002	• PIN, SPL - - * - -		1
- 29	554-1888-002	• COUPLING ROD ASSY		1
- 30	554-2159-003	• BRACKET, PWR AMPL - - * - -		1
- 31	MS35200-24	• SCREW V77250 342-0061-00 - - * - -		1
- 32		DELFTED		
- 33	554-1850-002	• PLATE, SPG		4
		ATTACHING PARTS		
- 34	MS35200-1	• SCREW V77250 342-0131-00 - - * - -		12
- 35	554-1848-002	• GUIDE, SPG		4
- 36	554-1846-002	• SPRING, HELICAL, COMPRESSION		1
- 37	554-2205-002	• COVER, INPUT BLOCK		1
		ATTACHING PARTS		
- 38	COML	• SCREW 343-0301-00		4
- 39	COML	• WASHER 310-0074-00 - - * - -		4
	554-1897-002	• CABLE ASSY, R-F		1
- 40	554-1894-002	• • BLOCK, INPUT		1
- 41	UG1465U	• • CONNECTOR, PLUG V71468 357-9836-010 A2A3P1		1
- 42	554-6371-003	• COVER, INPUT		1
- 43	554-2113-002	• COVER, INPUT		2
		ATTACHING PARTS		
- 44	COML	• SCREW 343-0300-00		7
- 45	COML	• WASHER 310-0074-00 - - * - -		7



ILLUSTRATED PARTS CATALOG

SECTION IV
R-F AMPLIFIER

FIG. - ITEM	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
18	- 46	554-1834-002	•	SLUG, LKG						0
				ATTACHING PARTS						
	- 47	MS51053-412	•	SETSCREW	V08664	335-0125-00				9
				- * - -						
	- 48	554-6373-004	•	BRACKET, SUPPORT, CHASSIS						1
				ATTACHING PARTS						
	- 49	MS35200-27	•	SCREW	V77250	342-0064-00				4
				- * - -						
	- 50	MS35216-12	•	SCREW	V77250	343-0133-00				4
	- 51	MS35337-78	•	WASHER	V79807	310-0278-00				4
	- 52	502-1515-002	•	WASHER, FLAT						4
	- 53	553-5026-003	•	WASHER						5
				ATTACHING PARTS						
	- 54	MS16632-1012	•	RING, RETAINING	V89462	340-0112-00				5
				- * - -						
	- 55	554-1924-003	•	ARM, ROCKER						4
	- 56	554-1925-003	•	ARM, ROCKER						1
	- 57	3TWL8-12PG11	•	BEARING, BALL, ANNULAR	V78118					2
				309-1794-00						
				ATTACHING PARTS						
	- 58	5108-50C	•	RING	V79136	340-0646-000				2
	- 58A	761-0015-003	•	WASHER, FLAT						2
				- * - -						
	- 59	554-2109-003	•	BRACKET, BRG						2
	- 60	S187-375HHP	•	BEARING, BALL, ANNULAR	V40920					1
		15LG31		309-1973-010						
	- 61	553-5025-003	•	WASHER						1
				ATTACHING PARTS FOR 60 AND 61						
	- 62	68-1660-40	•	NUT, SELF-LKG, HEX.	V72962	333-0605-00				1
	- 63	554-1880-002	•	POST, FOLLOWER						1
				- * - -						
		554-1904-003	•	SHAFT, ARM						1
	- 64	554-2111-002	•	ARM, FOLLOWER						1
				ATTACHING PARTS						
	- 65	MS24692-54	•	PIN	V72962	311-5013-00				1
				- * - -						
	- 66	554-1926-003	•	SHAFT, ARM						1
	- 67	554-1871-002	•	CAM ASSY						1
				ATTACHING PARTS						
	- 68	MS16624-18	•	RING, RETAINING	V89462	340-0004-00				1
				- * - -						
	- 69	554-1867-002	•	COVER, COUPLING						3
				ATTACHING PARTS						
	- 70	COML	•	SCREW	343-0298-00					12
	- 71	COML	•	WASHER	310-0074-00					12
				- * - -						
		554-1910-003	•	ADJUSTING ROD ASSY						2
				ATTACHING PARTS						
	- 72	68-1660-40	•	NUT, SELF-LKG, HEX.	V72962	333-0605-00				4
				- * - -						
	- 73	554-1845-002	•	ROD, ADJUSTING						1
				ATTACHING PARTS						
	- 74	MS16562-190	•	PIN	V72962	311-0417-00				1
				- * - -						
	- 75	554-1844-002	•	CAP, ADJUSTING ROD						1
	- 76	554-1930-003	•	PLATE, RETAINING, BRG						1
		554-1909-003	•	ADJUSTING ROD ASSY						1
				ATTACHING PARTS						
	- 77	68-1660-40	•	NUT, SELF-LKG, HEX.	V72962	333-0605-00				2
				- * - -						



FIG. & INDEX NO.	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
18	- 78.	554-1845-002	•	•	ROD, ADJUSTING					1
	- 79	MS16562-190	•	•	ATTACHING PARTS PIN V72962 311-0417-00					1
	- 80	554-1844-002	•	•	- - * - - CAP, ADJUSTING ROD					1
	- 81	554-1929-002	•	•	PLATE, RETAINING, BRG					1
	- 82	554-1876-002	•	•	BEARING, PLATE					2
	- 83	554-1877-002	•	•	BEARING, PLATE					1
		554-1960-004	•	•	TUNING CONDUCTOR ASSY					1
	- 84	COML	•	•	ATTACHING PARTS SCREW 347-0091-00					7
	- 85	COML	•	•	WASHER 310-0076-00					7
	- 86	554-1878-002	•	•	- - * - - INSULATOR, HEATER TERMINAL					1
	- 87	554-1889-002	•	•	COVER, GRID TERMINAL					1
	- 88	COML	•	•	ATTACHING PARTS SCREW 343-0297-00					4
	- 89	COML	•	•	WASHER 310-0074-00					4
	- 90	554-6327-003	•	•	- - * - - RING, GRID					1
	- 91	554-6328-004	•	•	CATHODE CONDUCTOR ASSY SEE FIG. 19					1
	- 92	COML	•	•	ATTACHING PARTS SCREW 342-0151-00					4
	- 93	554-1943-003	•	•	- - * - - CONDUCTOR, TUN					1
	- 93A	554-1881-002	•	•	TERMINAL, STUD					4
	- 93B	G3650WHT	•	•	TERMINAL, FEEDTHRU V12615					1
	- 93C	454D50	•	•	306-0071-00 RING, CONT V30817 139-3251-00					1
	- 93D	554-1959-004	•	•	CONDUCTOR, TUN					1
	- 94	554-1935-003	•	•	TUNING SLUG ASSY					1
	- 95	554-1875-002	•	•	BEARING, SLUG					1
	- 96	554-6368-002	•	•	CLAMP, CABLE					2
	- 97	COML	•	•	ATTACHING PARTS SCREW 347-0091-00					2
	- 98	COML	•	•	WASHER 310-0076-00					2
	- 99		•	•	- - * - -					
	-100	757-3020-001	•	•	DELETED STRAP, RETAINING					1
	-101	COML	•	•	ATTACHING PARTS SCREW 347-0071-00					1
	-102	COML	•	•	WASHER 310-0076-00					1
		554-1957-004	•	•	- - * - - TUNING CONDUCTOR ASSY					1
	-103	68-1660-40	•	•	ATTACHING PARTS NUT, SELF-LKG, HEX. V72962 333-0605-00					2
	-104	553-5055-003	•	•	WASHER					3
	-105	MS35237-78	•	•	WASHER V79807 310-0278-00					1
	-106	MS35216-12	•	•	SCREW V77250 343-0133-00					1
	-107	COML	•	•	WASHER 310-0076-00					6
	-108	COML	•	•	SCREW 347-0091-00					6
	-109	554-1889-002	•	•	- - * - - COVER, GRID TERMINAL					1
	-110	COML	•	•	ATTACHING PARTS SCREW 343-0297-00					4
	-111	COML	•	•	WASHER 310-0074-00					4
	-112	PC07GF102K	•	•	- - * - - RESISTOR, 1000 OHMS 10%, 1/4 W V01121					1
			•	•	745-0749-00 A2A3R3					



ILLUSTRATED PARTS CATALOG

SECTION IV
R-F AMPLIFIER

FIG. & INDEX NO.	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
18	-113	RC07GF151K	.	.	RESISTOR, 150 OHMS 10%, 1/4 W	V01121				1
			.	.	745-0710-00	A2A3R4				
	-114	554-1843-002	.	.	TERMINAL, STUD					1
	-115	554-1842-002	.	.	INSULATOR, BUSH.					1
	-116	554-1907-003	.	.	CONDUCTOR, GRID					2
	-117	554-1878-002	.	.	INSULATOR, HEATER TERMINAL					1
	-118	554-1952-004	.	.	CATHODE CONDUCTOR ASSY	SEE FIG. 19				1
			.	.	ATTACHING PARTS					
	-119	COML	.	.	SCREW	342-0151-00				4
			-	-	* - -					
		554-1949-004	.	.	CONDUCTOR, TUN					1
	-119A	554-6367-003	.	.	LEAD, R-F COUPLING					1
	-119B	554-6369-002	.	.	PING, RETAINING	EFF MCN 105				1
	-119C	554-1876-002	.	.	REARING, PLATE	EFF MCN 112				1
		554-6366-003	.	.	ADJUSTING ROD ASSY					1
	-120	554-1845-002	.	.	ROD, ADJUSTING					1
			.	.	ATTACHING PARTS					
	-121	MS16562-190	.	.	PIN	V72962	311-0417-00			1
			-	-	* - -					
	-122	554-1844-002	.	.	CAP, ADJUSTING ROD					1
	-123	554-6365-003	.	.	PLATE, RETAINING					1
	-123A	554-1881-002	.	.	TERMINAL, STUD					1
	-123B	G3650WHT	.	.	TERMINAL, FEEDTHRU	V12615				1
			.	.	306-0971-00					
	-123C	454D50	.	.	RING, CONT	V30817	139-3251-00			1
	-123D	554-1947-004	.	.	CONDUCTOR, TUN					1
	-124	554-1933-004	.	.	TUNING SLUG ASSY					1
	-125	554-1875-002	.	.	REARING, SLUG					1
		554-1956-004	.	.	TUNING CONDUCTOR ASSY					1
			.	.	ATTACHING PARTS					
	-126	COML	.	.	SCREW	347-0091-00				6
	-127	COML	.	.	WASHER	310-0076-00				6
			-	-	* - -					
	-128	554-1889-002	.	.	COVER, GRID TERMINAL					1
			.	.	ATTACHING PARTS					
	-129	COML	.	.	SCREW	343-0297-00				4
	-130	COML	.	.	WASHER	310-0074-00				4
			-	-	* - -					
	-131	RC07GF102K	.	.	RESISTOR, 1000 OHMS 10%, 1/4 W	V01121				1
			.	.	745-0749-00	A2A3R5				
	-132	RC07GF151K	.	.	RESISTOR, 150 OHMS 10%, 1/4 W	V01121				1
			.	.	745-0710-00	A2A3R6				
	-133	554-1843-002	.	.	TERMINAL, STUD					1
	-134	554-1842-002	.	.	INSULATOR, BUSH.					1
	-135	554-1907-003	.	.	CONDUCTOR, GRID					1
	-136	554-1878-002	.	.	INSULATOR, HEATER TERMINAL					1
	-137	554-1951-004	.	.	CATHODE CONDUCTOR ASSY	SEE FIG. 19				1
			.	.	ATTACHING PARTS					
	-138	COML	.	.	SCREW	342-0151-00				4
			-	-	* - -					
	-139	554-1948-004	.	.	CONDUCTOR, TUN					1
	-139A	554-1881-002	.	.	TERMINAL, STUD					1
	-139B	G3650WHT	.	.	TERMINAL, FEEDTHRU	V12615				1
			.	.	306-0971-00					
	-139C	554-1864-002	.	.	LEAD, R-F					1
	-139D	454D50	.	.	RING, CONT	V30817	139-3251-00			1
	-139F	554-1954-004	.	.	CONDUCTOR, TUN					1
	-140	554-1934-003	.	.	TUNING SLUG ASSY					1
	-141	554-1875-002	.	.	REARING, SLUG					1
	-142	554-6370-002	.	.	INSULATOR, BUSH.					3
		554-1958-004	.	.	TUNING CONDUCTOR ASSY					1

SECTION IV

R-F AMPLIFIER

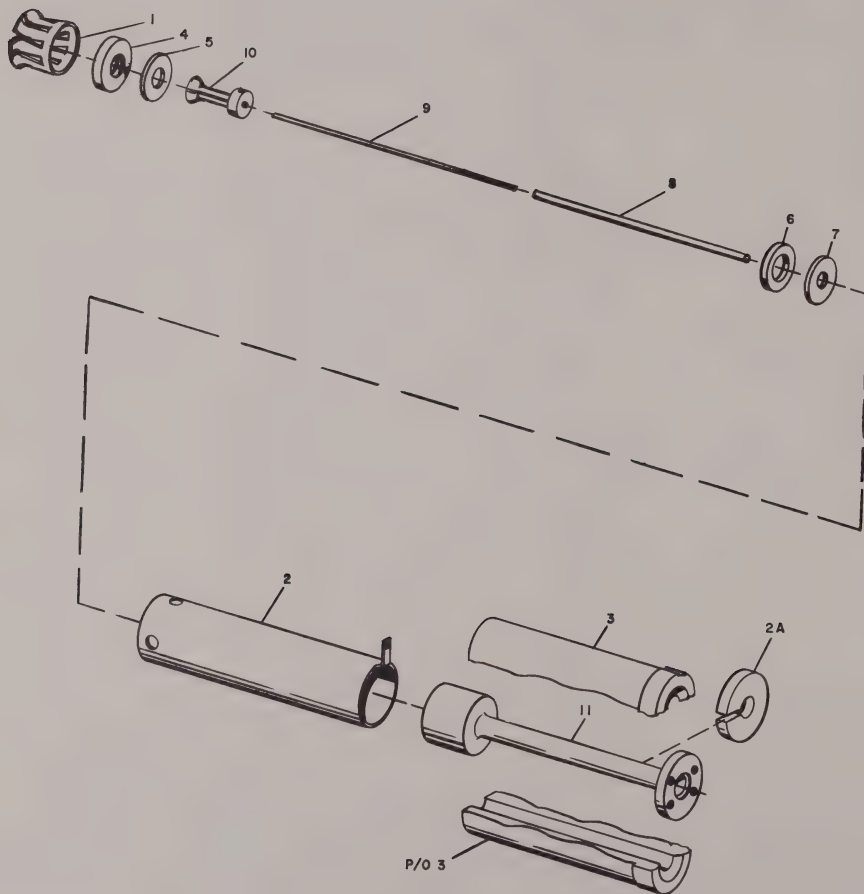
ILLUSTRATED PARTS
CATALOG

FIG. & INDEX NO.	PART NO.	NOMENCLATURE						USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6		
18		ATTACHING PARTS							
-143	COML	•	SCREW	347-0091-00					6
-144	COML	•	WASHER	310-0076-00					6
			- - * - -						
-145	554-1889-002	•	COVER, GRID TERMINAL						1
		•	ATTACHING PARTS						
-146	COML	•	SCREW	343-0297-00					4
-147	COML	•	WASHER	310-0074-00					4
			- - * - -						
-148	RC07GF102K	•	RESISTOR, 1000 OHMS 10%, 1/4 W	V01121					1
			745-0749-00	A2A3R7					
-149	RC07GF100K	•	RESISTOR, 10 OHMS 10%, 1/4 W	V01121					1
			745-0677-00	A2A3R8					
-150	554-1843-002	•	TERMINAL, STUD						1
-151	554-1842-002	•	INSULATOR, BUSH.						1
-152	554-1908-003	•	CONDUCTOR, GRID						1
-152A	554-1878-002	•	INSULATOR, HEATER TERMINAL						1
-153	554-1953-004	•	CATHODE CONDUCTOR ASSY	SEE FIG. 19					1
		•	ATTACHING PARTS						
-154	COML	•	SCREW	342-0151-00					4
			- - * - -						
-155	554-1950-004	•	CONDUCTOR, TUN						1
-155A	554-1864-002	•	LEAD, P-F	EFF MCN 101					1
-155B	554-1881-002	•	TERMINAL, STUD						1
-155C	G3650WHT	•	TERMINAL, EFFDTHRU	V12615					1
			306-0971-00						
-155D	454D50	•	RING, CONT	V30817	139-3251-00				1
-155E	554-1955-004	•	CONDUCTOR, TUN						1
-156	554-1936-00	•	TUNING SLUG ASSY						1
-157	554-1893-002	•	BEARING, SLUG						1
	554-2254-00	•	WIRING HARNESS, BRANCHED						1
-158	DEF9SC7	•	CONNECTOR, RECP	V71468	371-0164-00				2
			A2A1J1, A2A1J3						
		•	ATTACHING PARTS						
-159	MS35216-16	•	SCREW	V77250	343-0137-00				4
-160	MS35338-77	•	WASHER	V79807	310-0275-00				4
-161	541-5951-002	•	SPACER, SLV						4
			- - * - -						
-162	DAF15SC7	•	CONNECTOR, RECP	V71468	371-0165-00				1
			A2A1J2						
		•	ATTACHING PARTS						
-163	MS35216-13	•	SCREW	V77250	343-0134-00				1
-164	MS35216-15	•	SCREW	V77250	343-0136-00				1
-165	MS35338-77	•	WASHER	V79807	310-0275-00				2
-166	553-5111-003	•	WASHER						1
			- - * - -						
	554-1946-004	•	HOUSING, PWR AMPL						1
-167	SKT14BRN	•	JACK, TIP	V98291	360-0182-00	A2A3J1			1
-168	SKT14RED	•	JACK, TIP	V98291	360-0183-00	A2A3J2			1
-169	SKT14ORN	•	JACK, TIP	V98291	360-0184-00	A2A3J3			1
-170	SKT14YEL	•	JACK, TIP	V98291	360-0185-00	A2A3J4			1
-171	554-1861-002	•	CONDUCTOR, COUPLING	EFF THRU MCN 104					1
-172	554-1862-002	•	CONDUCTOR, COUPLING	EFF THRU MCN 104					2
-172A	554-6364-003	•	CONDUCTOR, COUPLING	EFF MCN 105					3
-173	MS16562-192	•	PIN	V72962	311-0419-00				2
-174	554-1928-003	•	HOLDER						1
-175			DELETED						
-176	MS16562-189	•	PIN	V72962	311-0416-00				4
-177	554-1874-002	•	SHAFT, SHOULDREED						1
-178	554-1869-002	•	CHOKF SECTION						4
-179	554-1961-005	•	HOUSING, PWR AMPL						1



ILLUSTRATED PARTS CATALOG

SECTION IV CATHODE CONDUCTOR ASSEMBLY

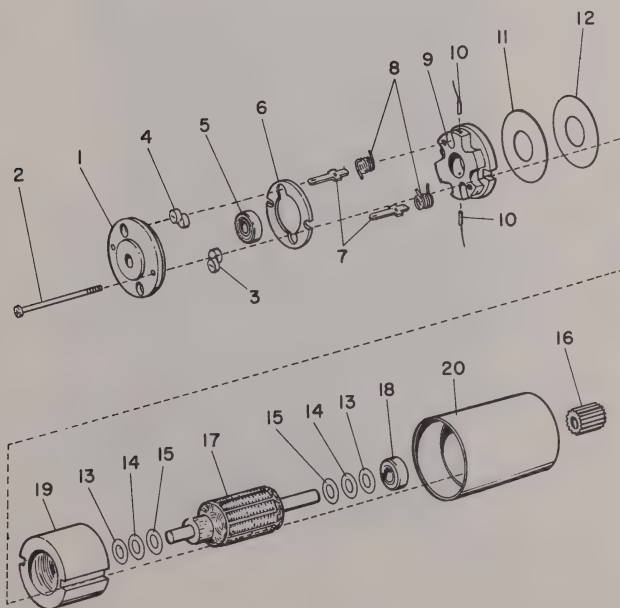


Cathode Conductor Assembly
Figure 19

SECTION IV

CATHODE CONDUCTOR
ASSEMBLYILLUSTRATED PARTS
CATALOG

FIG. & INDEX NO.	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
19 -	554-6328-004	CATHODE CONDUCTOR ASSY FOR NHA							G	REF
-	554-1952-004	CATHODE CONDUCTOR ASSY FOR NHA							H	REF
-	554-1951-004	CATHODE CONDUCTOR ASSY FOR NHA							J	REF
-	554-1953-004	CATHODE CONDUCTOR ASSY FOR NHA							K	REF
- 1	554-1839-002	• CONTACT, ELECTRICAL							G	1
- 2	554-6325-003	• CONDUCTOR, CATHODE							H, J	1
- 2	554-1931-003	• CONDUCTOR, CATHODE							K	1
- 2	554-1932-003	• CONDUCTOR, CATHODE							G	1
- 2A	554-6323-002	• INSULATOR, BUSH.							H, J	1
- 3	554-2238-002	• INSULATOR, BUSH.							K	1
- 3	554-1860-002	• INSULATOR, BUSH.								1
- 4	554-1882-002	• SPACER, CATHODE CONT								1
- 5	553-5024-003	• WASHER								1
- 6	554-1849-002	• INSULATOR, BUSH.								1
- 7	553-5024-003	• WASHER								1
- 8	TEFTW18B	• INSULATION SLEEVING, ELECTRICAL V81851 152-2513-00								AP
- 9	554-1851-002	• TERMINAL, HEATER								1
- 10	554-1900-003	• CONTACT, ELECTRICAL								1
- 11	554-1912-003	• CONDUCTOR, CATHODE							G, H	1
- 11	554-1913-003	• CONDUCTOR, CATHODE							J	1
									K	1

D-C Motor
Figure 20

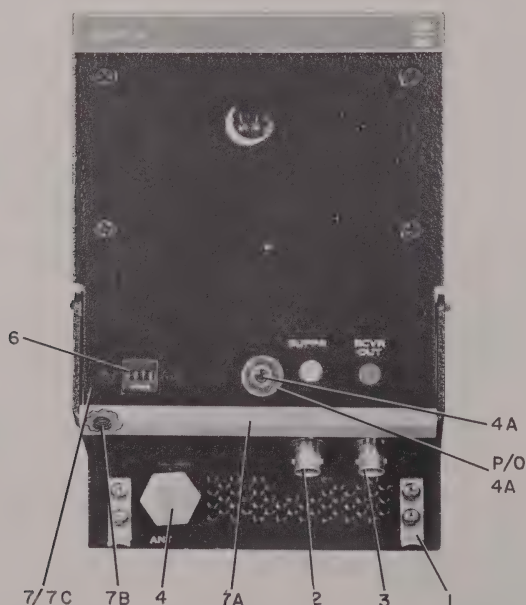


ILLUSTRATED PARTS CATALOG

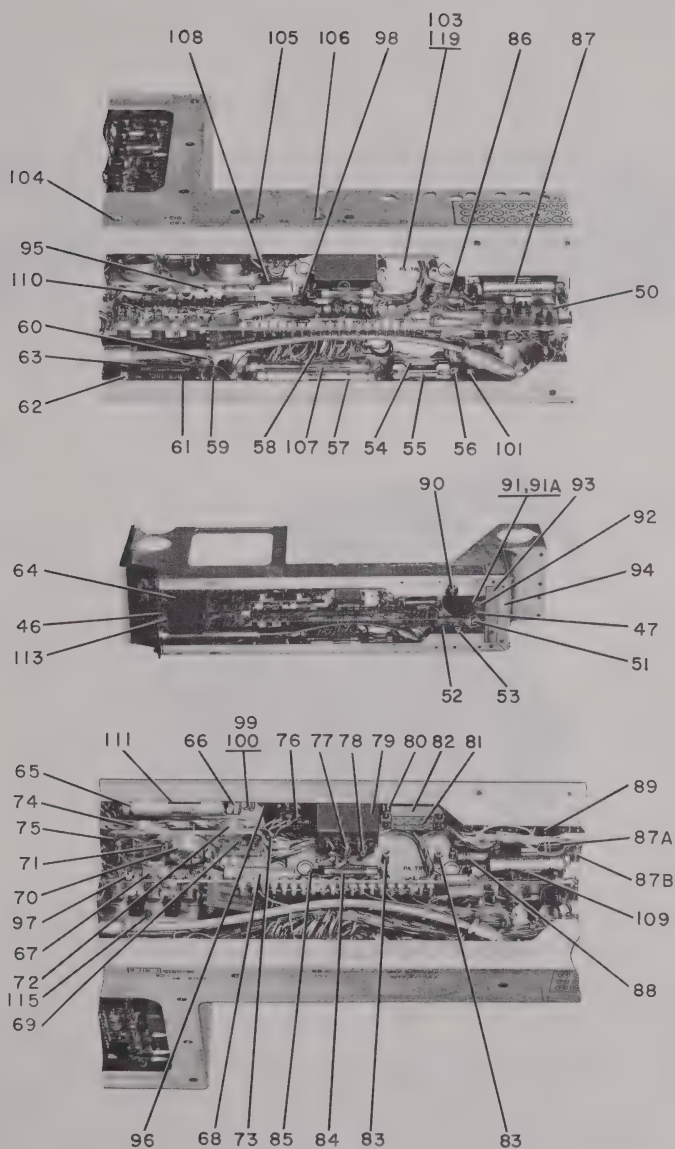
SECTION IV

D-C MOTOR

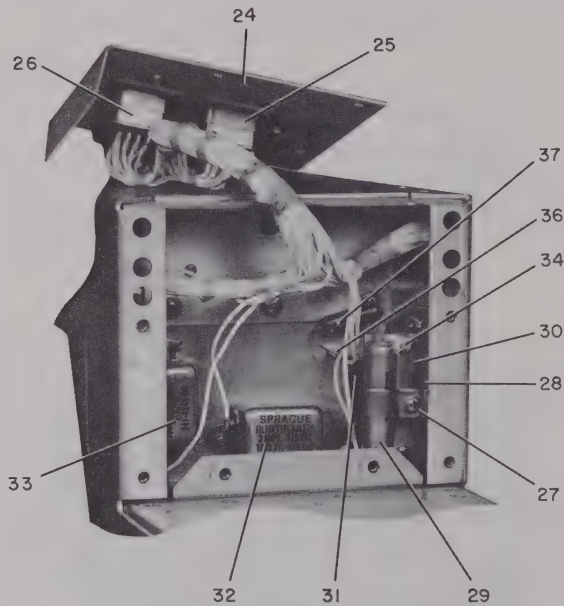
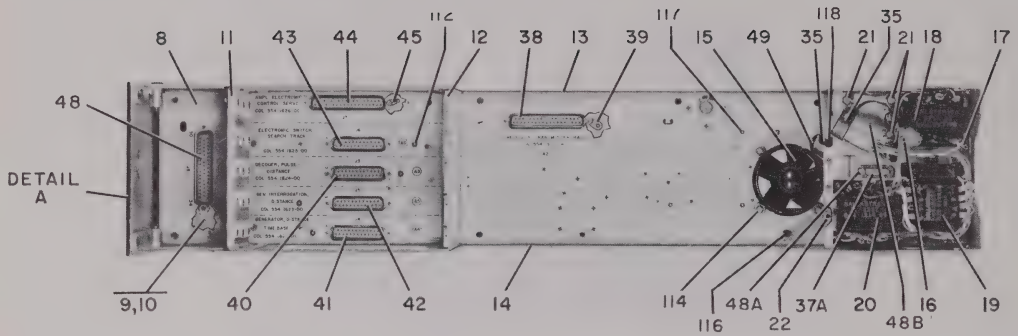
FIG. & INDEX NO.	PART NO.	NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
		1 2 3 4 5 6 7		
20 -	41A245	D-C MOTOR V25140 230-0338-00 A2A1B1 SEE FIG. 15-189 FOR NHA		REF
- 1	34D546	. END BELL		1
- 2	A1D611	. ATTACHING PARTS		2
- 3	R6D614-1	. SCREW		1
- 4	R6D614-2	. * - *		1
- 5	15554	. GROMMET, RUB.		1
- 6	9D657	. GROMMET, RUB.		1
- 7	R32D562	. BEARING, BALL		1
- 8	R10D604	. INSULATOR, DISK		1
- 9	6D613	. TERMINAL		2
- 10	40D673	. SPRING, HELICAL, TORSION		1
- 11	A9D738	. HOLDER, BRUSH		2
- 12	A9D656	. BRUSH, ELECTRICAL CONT		AP
- 13	A21D595-1	. SHIM		AP
- 14	A21DK95-2	. SHIM		AP
- 15	A21D543-3	. SHIM		2
- 16	3D932	. SHIM		1
- 17	7A984-2	. GEAR, SPUR		1
- 18	15554	. ARMATURE, MOTOR		1
- 19	R29D513	. BEARING, BALL		1
- 20	4D713	. MAGNET, PERMANENT		1
		. HOUSING		1



Power Supply Chassis (Sheet 1 of 3)
Figure 21



Power Supply Chassis (Sheet 2 of 3)
Figure 21



Power Supply Chassis (Sheet 3 of 3)
Figure 21



FIG. & INDEX NO.	PART NO.	NOMENCLATURE						USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6		
21	-	554-1621-011	POWER SUPPLY CHASSIS	A1	SEE FIG. 1-13			A,F	RFF
R 21	-	554-1621-00	FOR NHA POWER SUPPLY CHASSIS	A1	SEE FIG. 1-13			B,L M	RFF
R 21	-	554-1621-018	FOR NHA POWER SUPPLY CHASSIS	A1	SEE FIG. 1-13			C,N	RFF
21	-	554-1621-014	FOR NHA POWER SUPPLY CHASSIS	A1	SEE FIG. 1-13			D	RFF
21	-	554-1621-013	FOR NHA POWER SUPPLY CHASSIS	A1	SEE FIG. 1-13			F	RFF
	- 1	503-4970-001	• BRACKET, ANGLE						2
			ATTACHING PARTS						
		MS35216-27	• SCREW V77250	343-0171-00					4
		MS35338-79	• WASHER V79807	310-0282-00					4
			- - * - -						
	- 2	UG1094U	• CONNECTOR, RECP	V71468	357-9183-00				1
			A1J10						
	- 3	UG1094U	• CONNECTOR, RECP	V71468	357-9183-00				1
			A1J11						
R 4	- 4	5197	• FILTER, LOW PASS	V70998	241-0684-00				1
F			A1FL5, A1J1, A1J9						
			ATTACHING PARTS						
	- 4	MS35200-13	• SCREW V77250	342-0045-00					3
			- - * - -						
	- 4A	23-1	• SWITCH, PUSH	V81073	260-1294-00	A1S1			1
			EFF MCN 200						
			ATTACHING PARTS						
		553-5127-003	• WASHER						1
			- - * - -						
	- 5		DELETED						
	- 6	K19203C4A	• METER, TIME TOTALIZING	V82227				A,F	1
			458-0964-00	A1M1					
R 6	- 6	554-6310-003	• PLATE, METER					B,C,D,E L,M,N	1
			ATTACHING PARTS						
		68-1660-40	• NUT, SELF-LKG, HEX.	V72962	333-0605-00				2
R 8		502-1515-002	• WASHER, FLAT					B,C,D E,L,M	2
		COML	• SCREW	330-3590-00	EFF THRU MCN 111				2
		COML	• SCREW	330-3600-00	EFF MCN 112				2
			- - * - -						
	- 7	757-3002-001	• PANEL, FRONT						1
			ATTACHING PARTS						
		COML	• SCREW	342-0022-00					4
		COML	• SCREW	342-0024-00					2
			- - * - -						
	- 7A	757-3003-001	• HANDLE ASSY						1
			ATTACHING PARTS						
		F22NM107-62	• NUT, SELF-LKG, HEX.	V72962	333-1060-00				2
		COML	• WASHER	302-0638-020					4
		761-5190-001	• PIN, HINGE						2
			- - * - -						
	- 7B	761-5187-001	• BUMPER, RUB.						2
	- 7C	554-2066-004	• PANEL, FRONT						1
	- 8	554-2055-003	• BRACKET, DISTANCE MECHANISM						1
	- 9	G4777-10	• TERMINAL, STUD	V12615	306-1018-00	A1E27			1
	- 10	4040-2HOT	• TERMINAL, LUG	V77147	304-0014-00				2
		TINNED							
			ATTACHING PARTS FOR 8 THRU 10						
		68-1660-26	• NUT, SELF-LKG, HEX.	V72962	333-0604-00				2
		MS35337-77	• WASHER	V79807	310-0070-00				1
		548-6945-002	• SPACER, SLV						2
		MS35200-6	• SCREW	V77250	342-0136-00				2
			- - * - -						



ILLUSTRATED PARTS CATALOG

SECTION IV POWER SUPPLY CHASSIS

FIG. & INDEX NO.	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
21-	- 11	554-2063-003	.	BRACKET, TERMINAL BOARD						1
	- 12	554-2064-003	.	BRACKET, TERMINAL BOARD						1
			.	ATTACHING PARTS FOR 11 AND 12						
		MS35200-12	.	SCREW V77250 342-0044-00						10
		MS35216-11	.	SCREW V77250 343-0132-00						1
			- - * - -							
	- 13	554-2079-005	.	CHASSIS, ELECTRICAL EQUIP.						1
	- 14	554-2081-005	.	CHASSIS, ELECTRICAL EQUIP.						1
			.	ATTACHING PARTS FOR 13 AND 14						
		MS35200-12	.	SCREW V77250 342-0044-00						17
		MS35200-4	.	SCREW V77250 342-0134-00						4
		MS35200-11	.	SCREW V77250 342-0043-00						4
		COML	.	WASHER 310-0045-00						4
			- - * - -							
	- 15	A0-19046	.	FAN, VANFAXIAL V82877 009-3047-00 A1B1						1
			.	ATTACHING PARTS						
		109054-325	.	CLAMP, RIM CLENCHING V06773 015-0976-00						3
			- - * - -							
	- 16	RTMT12M	.	TERMINAL, STUD V91663 306-0976-00 A1F29						1
	- 17	4007-4HOT TINNED	.	TERMINAL, LUG V77147 304-0015-00						1
	- 18	BC3238	.	TRANSFORMER, PWR V97315 662-0131-00 A1T3						1
			.	ATTACHING PARTS FOR 16 THRU 18						
		COML	.	NUT 313-0132-00						3
		MS35337-78	.	WASHER V79807 310-0278-00						4
		MS35200-12	.	SCREW V77250 342-0044-00						4
			- - * - -							
	- 19	BC3236A	.	TRANSFORMER, PWR V97315 662-0129-00 A1T2						1
			.	ATTACHING PARTS						
		MS35200-12	.	SCREW V77250 342-0044-00						4
			- - * - -							
	- 20	BC3237A	.	TRANSFORMER, PWR V97315 662-0130-00 A1T1						1
			.	ATTACHING PARTS						
		COML	.	NUT 313-0132-00						4
		COML	.	WASHER 310-0078-00						4
		MS35200-12	.	SCREW V77250 342-0044-00						4
			- - * - -							
R	- 21	RTMT12M	.	TERMINAL, STUD V91663 306-0976-00 A1F12 THRU A1E15 EFF THRU MCN 3248						4
			.	ATTACHING PARTS						
		MS35200-12	.	SCREW V77250 342-0044-00						4
			- - * - -							
R	- 21	540-9041-003	.	POST, ELECTRICAL MECHANICAL EQUIP. EFF MCN 3249						3
			.	ATTACHING PARTS						
R		MS51959-13	.	SCREW V77250 342-0044-000						3
R		MS35337-78	.	WASHER V79807 310-0278-000						3
			- - * - -							
	- 22	RTMT12M	.	TERMINAL, STUD V91663 306-0976-00 A1E4 THRU A1E6						3
			.	ATTACHING PARTS						
		COML	.	SCREW 347-0006-00						3
		MS35337-78	.	WASHER V79807 310-0278-00						3
			- - * - -							
R	- 23		.	DELETED						

June 1/67

SECTION IV

POWER SUPPLY
CHASSISILLUSTRATED PARTS
CATALOG

FIG. & INDEX NO.	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
21	- 24	554-2068-004	•	BRACKET, ELECTRICAL CONN ATTACHING PARTS						1
		MS35216-12	•	SCREW V77250 343-0133-00						2
		COML	•	WASHER 310-0045-00						2
		MS35200-13	•	SCREW V77250 342-0045-00						3
			-	* - -						
		554-2171-00	•	WIRING HARNESS, BRANCHED						1
	- 25	DPA32-34P1	•	• CONNECTOR, RECP V71468 370-2071-00						1
				A1P1						
	- 26	DPA32-34P1	•	• CONNECTOR, RECP V71468 370-2071-00						1
				A1P2						
				ATTACHING PARTS FOR 25 AND 26						
		MS35200-3	•	• SCREW V77250 342-0133-00						8
		546-4670-002	•	• PLATE, CONN						4
			-	* - -						
	- 27	554-6379-002	•	CLAMP, RETAINING ATTACHING PARTS						1
		MS35216-11	•	SCREW V77250 343-0132-00						1
			-	* - -						
	- 28	SDR1K02154M	•	CAPACITOR, 150,000 UUF 20%, 200 VDCW						1
				V53021 931-4510-00 A1C14						
	- 29	SDR1K02154M	•	CAPACITOR, 150,000 UUF 20%, 200 VDCW						1
				V53021 931-4510-00 A1C15						
	- 30	554-6380-002	•	PLATE, MTG ATTACHING PARTS						1
		MS35216-12	•	SCREW V77250 343-0133-00						2
			-	* - -						
	- 31	3JX37A	•	FILTER, RAD INTFER V56289 241-0248-00						1
				A1FL2						
	- 32	3JX37A	•	FILTER, RAD INTFER V56289 241-0248-00						1
				A1FL3						
	- 33	3JX37A	•	FILTER, RAD INTFER V56289 241-0248-00						1
				A1FL4						
	- 34	540-9047-003	•	POST, ELECTRICAL-MECHANICAL EQUIP.						2
	- 35	1051	•	STRAP, RETAINING V71785 139-0792-00						2
				ATTACHING PARTS FOR 31 THRU 35						
		68-1660-40	•	NUT, SELF-LKG, HEX. V72962 333-0605-00						4
		MS35216-12	•	SCREW V77250 343-0133-00						6
			-	* - -						
	- 36	RTMT12-2M	•	TERMINAL, STUD V91663 306-0980-00 A1F28						1
				ATTACHING PARTS						
		MS35216-11	•	SCREW V77250 343-0132-00						1
		MS35337-77	•	WASHER V79807 310-0070-00						1
			-	* - -						
	- 37	18-746	•	COIL, 175 UH V09250 240-2076-00 A1L2						1
		554-2172-00	•	WIRING HARNESS, BRANCHED						1
		554-2173-00	•	WIRING HARNESS, BRANCHED						1
		554-2170-00	•	WIRING HARNESS, BRANCHED						1
	- 37A	DAF15SC33	•	• CONNECTOR V71468 371-0165-000 A1J15						1
				EFF MCN 3249						
				ATTACHING PARTS						
		MS51959-3	•	• SCREW V77250 342-0133-000						2
		MS35337-77	•	• WASHER V79807 310-0070-000						2
			-	* - -						
	- 38	DCF37SC7	•	• CONNECTOR, RECP V71468 371-0167-00						1
				A1J2						
	- 39	4007-4HOT TINNF0	•	• TERMINAL, LUG V77147 304-0015-00						1
				ATTACHING PARTS FOR 38 AND 39						
		68-1660-26	•	• NUT, SELF-LKG, HEX. V72962 333-0604-00						2
		548-6945-002	•	• SPACER, SLV						2
		MS35200-6	•	• SCREW V77250 342-0136-00						2
			-	* - -						
	- 40	DBF25SC7	•	• CONNECTOR, RECP V71468 371-0166-00						1
				A1J3						



ILLUSTRATED PARTS CATALOG

SECTION IV POWER SUPPLY CHASSIS

FIG. & INDEX NO.	PART NO.	NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
		1 2 3 4 5 6 7		
21	- 41	DBF25SC7 . . CONNECTOR, RECP V71468 371-0166-00		1*
	- 42	DBF25SC7 . . CONNECTOR, RECP V71468 371-0166-00		1
	- 43	DBF25SC7 . . CONNECTOR, RECP V71468 371-0166-00		1
	- 44	DCF37SC7 . . CONNECTOR, RECP V71468 371-0167-00		1
	- 45	4040-2HOT TINNED . . TERMINAL, LUG V77147 304-0014-00		5
		ATTACHING PARTS FOR 41 THRU 45		
		68-1660-26 . . NUT, SELF-LKG, HFX. V72962 333-0604-00		10
		554-2048-002 . . SPACER, SLV		10
		MS35200-6 . . SCREW V77250 342-0136-00		10
		- - * - -		
	- 46	905-45-55 . . GROMMET V75543 201-1060-00		1
	- 47	911 . . GROMMET V75543 201-1080-00		1
	- 48	DDF50SC7 . . CONNECTOR, RECP V71468 371-0182-00		1
R	- 48A	540-9014-003 . POST, ELECTRICAL MECHANICAL EQUIP.		2
		EFF MCN 3249		
		ATTACHING PARTS		
R		MS51957-4 . SCREW V77250 343-0125-000		2
R		MS35337-77 . WASHER V79807 310-0070-000		2
		- - * - -		
R	- 48B	554-2075-004 . BRACKET, PWR SUPPLY		1
		ATTACHING PARTS		
R		MS51959-14 . SCREW V77250 342-0045-000		2
		- - * - -		
	- 49	HP5N . CLAMP, LOOP V09922 150-1542-00		1
	- 50	554-2040-004 . POWER SUPPLY SUBASSEMBLY SEE FIG. 22		1
		ATTACHING PARTS		
		68-1660-40 . NUT, SELF-LKG, HFX. V72962 333-0605-00		3
		MS35216-10 . SCREW V77250 343-0131-00		3
		- - * - -		
	- 51	4040-2HOT TINNED . . TERMINAL, LUG V77147 304-0014-00		1
	- 52	554-2062-00 . FILTER ASSY PART OF A1FL1		1
		ATTACHING PARTS FOR 51 AND 52		
		68-1660-26 . NUT, SELF-LKG, HFX. V72962 333-0604-00		3
		MS35216-3 . SCREW V77250 343-0124-00		5
		MS35216-12 . SCREW V77250 343-0133-00		2
		- - * - -		
	- 53	FCSC . . FILTER, RAD INTERFER V01121 241-0276-00		23
	- 54	F02A250V1-2 . FUSE, CARTRIDGE V71400 264-4030-00 A1F3		1
		AS		
	- 55	F02A250V1 . FUSE, CARTRIDGE V71400 264-4060-00 A1F4		1
		1-2AS		
	- 56	357001 . FUSEHOLDER V75915 265-1114-00 A1XF3,		2
		A1XF4		
		ATTACHING PARTS		
		COML . NUT 313-0132-00		2
		COML . WASHER 310-0045-00		2
		MS35200-14 . SCREW V77250 342-0046-00		2
		- - * - -		
	- 57	600D157F060 . CAPACITOR, 150 UF +75-10%, 60 VDCW V56289		1
		DM4 183-1277-600 A1C4		
	- 58	600D157F060 . CAPACITOR, 150 UF +75-10%, 60 VDCW V56289		1
		DM4 183-1277-600 A1C1		
	- 59	1N645 . SEMICONDUCTOR DEVICE V03508 353-2607-00		1
		A1CR14		
	- 60	1N645 . SEMICONDUCTOR DEVICE V03508 353-2607-00		1
		A1CR15		

SECTION IV

POWER SUPPLY
CHASSISILLUSTRATED PARTS
CATALOG

FIG. & INDEX NO.	PART NO.	NOMENCLATURE						USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6 7		
21	- 61	RW29V470	•	RESISTOR, 47 OHMS 10%, 11 W	V91637				1
	- 62	015-0558-00	•	746-6137-00 A1R11					1
			•	POST, ELECTRICAL-MECHANICAL EQUIP.					1
			•	ATTACHING PARTS FOR 61 AND 62					1
		MS35216-13	•	SCREW V77250 343-0134-00					1
		504-0730-003	•	WASHER					1
		302-2300-00	•	INSULATOR, WASH.					1
		302-0347-00	•	INSULATOR, WASH.					1
		MS35216-14	•	SCREW V77250 343-0135-00					1
		MS35338-78	•	WASHER V79807 310-0279-00					1
			- - *						
	- 63	600D306G070	•	CAPACITOR, 33 UF +75-10%, 75 VDCW	V56289				1
		DE4	•	183-1277-440 A1C6					1
	- 64	53-02C	•	DELAY LINE V00222 799-0084-00 A1DL1					1
			•	ATTACHING PARTS					1
		MS35200-12	•	SCREW V77250 342-0044-00					4
			- - *						
	- 65	600D306G070	•	CAPACITOR, 33 UF +75-10%, 75 VDCW	V56289				1
		DE4	•	183-1277-440 A1C10					1
	- 66	29F2135G2	•	CAPACITOR, 25 UF 15%, 200 VDCW	V06001 184-8578-00				1
			•	A1C9					1
	- 67	109D187X9025	•	CAPACITOR, 180 UF 10%, 25 VDCW	V56289				1
		T2	•	184-7804-00 A1C7					1
	- 68	600D306G070	•	CAPACITOR, 35 UF +75-10%, 75 VDCW	V56289				1
		DE4	•	183-1277-440 A1C3					1
	- 69	554-2239-003	•	SEMICONDUCTOR DEVICE SET					1
			•	ATTACHING PARTS					1
		68-1660-40	•	NUT, SELF-LKG, HEX. V72962 333-0605-00					2
			- - *						
	- 70	2N1488	•	TRANSISTOR V96214 352-0466-00 A1Q4					1
	- 71	2104-06-02-2520N	•	TERMINAL, LUG V78189 304-0318-00					1
			•	ATTACHING PARTS FOR 70 AND 71					1
		COML	•	NUT 313-0140-00					1
		COML	•	WASHER 310-0076-00					2
		554-2050-002	•	INSULATOR, BUSH.					2
		547-8177-002	•	BUSHING, INSULATED					1
		COML	•	WASHER 310-0054-00					1
		COML	•	SCREW 343-0290-00					1
		COML	•	SCREW 343-0332-00					1
			- - *						
	- 72	2N1488	•	TRANSISTOR V96214 352-0466-00 A1Q1					1
	- 73	2104-06-02-2520N	•	TERMINAL, LUG V78189 304-0318-00					1
			•	ATTACHING PARTS FOR 72 AND 73					1
		COML	•	NUT 313-0140-00					1
		COML	•	WASHER 310-0077-00					1
		COML	•	WASHER 310-0055-00					7
		302-2300-00	•	INSULATOR, WASH.					1
		554-2030-002	•	BUSHING, CAPTIVE SCR					1
		COML	•	SCREW 343-0332-00					1
			- - *						
	- 74	2N1488	•	TRANSISTOR V96214 352-0466-00 A1Q5					1
			•	ATTACHING PARTS					1
		COML	•	NUT 313-0140-00					1
		COML	•	WASHER 310-0077-00					1
		COML	•	WASHER 310-0033-00					1
		302-2300-00	•	INSULATOR, WASH.					1
		554-2050-002	•	INSULATOR, BUSH.					1
		COML	•	SCREW 343-0332-00					1
			- - *						
	- 75	554-2204-002	•	BRACKET, TSTP					1
	- 76	A12527	•	TRANSFORMER, PWR V70674 662-0477-00					1
			•	A1T4 EFF THRU MCN 256					1



ILLUSTRATED PARTS CATALOG

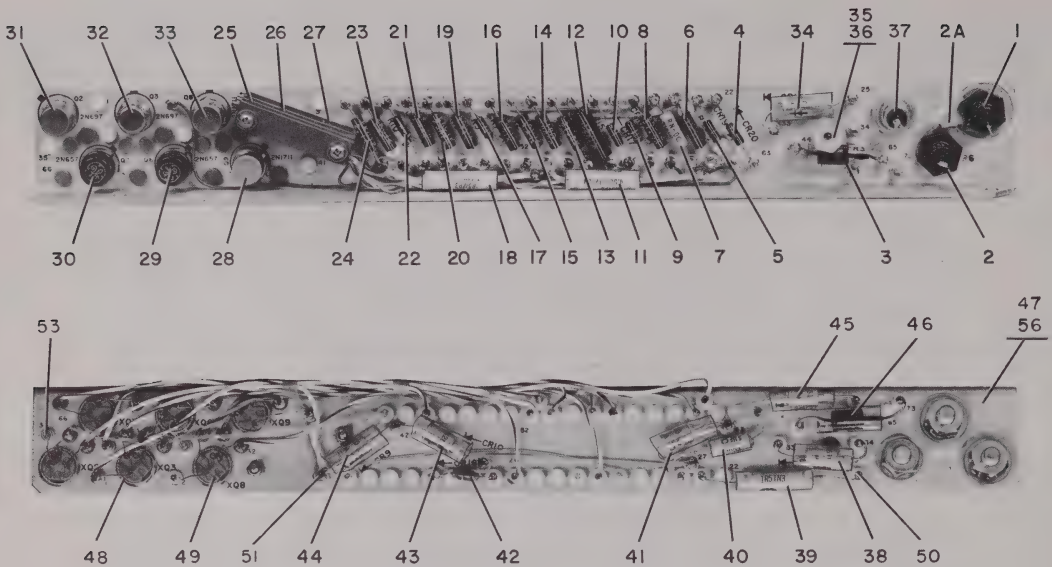
SECTION IV
POWER SUPPLY
CHASSIS

FIG. & INDEX NO.	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
21 - 76	554-6306-002	•	TRANSFORMER, PWR	A1T4	EFF	MCN	257			1
		•	ATTACHING PARTS							
	68-1660-40	•	NUT, SELF-LKG, HFX.	V72962	333-0605-00					2
		•	EFF THRU MCN 256							
	MS35200-12	•	SCREW	V77250	342-0044-00					2
		•	- - * - -							
- 77	RN60C2151F	•	RESISTOR, 2150 OHMS 1%, 1/8 W	V75042						1
		•	705-6281-00 A1R18							
- 78	RN60C2151F	•	RESISTOR, 2150 OHMS 1%, 1/8 W	V75042						1
		•	705-6281-00 A1R19							
- 79	BC3246	•	TRANSFORMER, PWR	V97315	664-0022-00					1
		•	A1T5							
		•	ATTACHING PARTS							
	MS35200-12	•	SCREW	V77250	342-0044-00					4
		•	- - * - -							
- 80	540-9010-003	•	POST, ELECTRICAL-MECHANICAL EQUIP.							4
- 81	757-3017-001	•	PRINTED CONNECTOR						A,B,D F,L,M C,E,N	1
- 81	3SAH1127A2	•	RELAY, ARM.	V01526	974-0839-00	A1K1				1
- 82	HRCC1M	•	SOCKET, RELAY	V91663	220-1450-010	A1XK1				1
		•	ATTACHING PARTS FOR 80 THRU 82							
	MS35200-3	•	SCREW	V77250	342-0133-00					4
	MS35216-5	•	SCREW	V77250	343-0126-00					4
	COML	•	WASHER	310-0044-00						4
		•	- - * - -							
- 83	540-9007-003	•	POST, ELECTRICAL-MECHANICAL EQUIP.	FFF						2
		•	THRU MCN 111							
- 83	540-9004-003	•	POST, ELECTRICAL-MECHANICAL EQUIP.	FFF						2
		•	MCN 112							
		•	ATTACHING PARTS							
	MS35200-2	•	SCREW	V77250	342-0132-00					2
		•	- - * - -							
- 84	F02A250V1 1-2AS	•	FUSE, CARTRIDGE	V71400	264-4060-00	A1F1				1
- 85	357001	•	FUSEHOLDER	V75915	265-1114-00	A1XF1				1
		•	ATTACHING PARTS							
	COML	•	NUT	313-0132-00						1
	COML	•	WASHER	310-0045-00						1
	MS35216-13	•	SCREW	V77250	343-0134-00					1
		•	- - * - -							
- 86	1N2610	•	SEMICONDUCTOR DEVICE	V03508	353-1905-00					1
		•	A1CR23							
- 87	SDB1K04224M	•	CAPACITOR, 220,000 UUF 20%, 400 VDCW							1
		•	V53021 931-4555-00 A1C11							
- 87A	1N645	•	SEMICOND DEVICE	353-2607-000	A1CR25					1
- 87B	TF300	•	TERMINAL	V98291	306-1018-000					2
		•	A1E9, A1E32							
		•	ATTACHING PARTS							
	MS51959-2	•	SCREW	V77250	342-0132-000					2
		•	- - * - -							
- 88	2500-62	•	COIL, 5000 UH	V99800	240-2557-00	A1L1				1
- 89	554-2070-004	•	FILTER ASSY PART OF A1FL1							1
		•	ATTACHING PARTS							
	68-1660-26	•	NUT, SELF-LKG, HFX.	V72962	333-0604-00					2
	MS35216-3	•	SCREW	V77250	343-0124-00					4
	MS35200-3	•	SCREW	V77250	342-0133-00					2
		•	- - * - -							
- 90	FCSC	•	FILTER, RAD INTERF	V01121	241-0276-00					41
- 91	F02A250V1 1-2AS	•	FUSE, CARTRIDGE	V71400	264-4060-00	A1F2				1
		•	FFF THRU MCN 1300							
- 91	MDL1	•	FUSE, CARTRIDGE	V71400	264-0295-00	A1F2				1
		•	EFF MCN 1310 SB-24							
- 91A	280-3782-010	•	PLATE, INFORMATION	SB-24						1
- 92	357001	•	FUSEHOLDER	V75915	265-1114-00	A1XF2				1
		•	ATTACHING PARTS							

SECTION IV

POWER SUPPLY
CHASSISILLUSTRATED PARTS
CATALOG

FIG. & INDEX NO.	PART NO.	NOMENCLATURE						USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6		
21	MS35216-27	•	SCREW	V77250	343-0171-00				1
	COML	•	WASHER	310-0046-00					1
			- - *	- -					
- 93	554-2042-003	•	BRACKET, SHLD						1
			ATTACHING PARTS						
	MS35216-13	•	SCREW	V77250	343-0124-00				3
	COML	•	WASHER	310-0045-00					2
			- - *	- -					
- 94	554-2046-002	•	NUT, PLATE						1
			ATTACHING PARTS						
	MS35200-13	•	SCREW	V77250	342-0045-00				2
			- - *	- -					
- 95	RTMT12-2M	•	TERMINAL, STUD	V91663	306-0980-00	A1E1			11
			THRU	A1E3, A1E7, A1E9, A1F10, A1F16,					
				A1E19, A1E22, A1E25, A1E26					
			ATTACHING PARTS						
	MS35200-2	•	SCREW	V77250	342-0132-00				11
	MS35337-77	•	WASHER	V79807	310-0070-00				1
			- - *	- -					
- 96	AB396-1	•	TERMINAL, STUD	V12615	306-1281-00				3
				A1E20, A1E23, A1E24					
			ATTACHING PARTS						
	MS35200-2	•	SCREW	V77250	342-0132-00				3
	MS35337-77	•	WASHER	V79807	310-0070-00				3
			- - *	- -					
- 97	G4777-10	•	TERMINAL, STUD	V12615	306-1018-00	A1E8,			3
				A1E18, A1E21					
			ATTACHING PARTS						
	MS35200-2	•	SCREW	V77250	342-0132-00				3
			- - *	- -					
- 98	4040-2HOT TINNED	•	TERMINAL, LUG	V77147	304-0014-00				1
			ATTACHING PARTS						
	MS35649-24	•	NUT	V77250	313-0037-00				1
	MS35337-77	•	WASHER	V79807	310-0070-00				1
	MS35200-2	•	SCREW	V77250	342-0132-00				1
			- - *	- -					
- 99	RTMT12-2M	•	TERMINAL, STUD	V91663	306-0980-00	A1E11			1
-100	4040-2HOT TINNED	•	TERMINAL, LUG	V77147	304-0014-00				1
			ATTACHING PARTS FOR 99 AND 100						
	MS35200-2	•	SCREW	V77250	342-0132-00				1
	MS35337-77	•	WASHER	V79807	310-0070-00				1
			- - *	- -					
-101	540-9041-003	•	POST, ELECTRICAL-MECHANICAL EQUIP.						1
			ATTACHING PARTS						
	COML	•	SCREW	330-2290-00					1
			- - *	- -					
-102			DELETED						
-103	554-2083-005	•	CHASSIS, ELECTRICAL EQUIP.						1
-104	SKT41BLK	•	JACK, TIP	V98291	360-0257-00	A1J12			1
-105	SKT41BLK	•	JACK, TIP	V98291	360-0257-00	A1J12			1
-106	SKT41BLK	•	JACK, TIP	V98291	360-0257-00	A1J14			1
-107	6080-1CC	•	CLIP	V91506	139-2341-000				2
-108	100-200-16-1	•	RETAINER	V99378	141-0339-000				3
			ATTACHING PARTS FOR 107 AND 108						
	MS20426AD3-3	•	RIVET	V12014	305-1361-000				10
			- - *	- -					
-109	100-200-9-3	•	CLIP	V99378	139-2221-000				1
-110	100-200-16-8	•	CLIP	V99378	139-0759-000				1
			ATTACHING PARTS FOR 109 AND 110						



Power Supply Subassembly
Figure 22

FIG. & INDEX NO.	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
R 21	MS20426AD3-3	.	.	RIVET	V12014	305-1361-000				2
R	-111 100-200-8A6	.	.	CLIP	V99378	139-2224-000				1
R	MS20426AD2-3	.	.	RIVET	V12014	305-1352-000				2
R	-112 540-7764-000	.	.	PIN, LOCATING						5
R	-113 F12NCFMA2-62	.	.	NUT, SELF-LKG, CLINCH	V72962					1
R	-114 F440-1	.	.	NUT, PLAIN, CLINCH	V46384					3
R	-115 FHS440-5	.	.	STUD, CAPTIVE	V46384	330-2793-000				5
R	-116 F12NCFMA2-82	.	.	NUT, SELF-LKG, CLINCH	V72962					6
R	-117 F22NCFMA2-26	.	.	NUT, SELF-LKG, CLINCH	V72962					5
R	-118 F22NCFMA2-40	.	.	NUT, SELF-LKG, CLINCH	V72962					18
R	-119 554-2082-005	.	.	CHASSIS, ELECTRICAL EQUIP.						1
22	- 554-2040-004	POWER SUPPLY SUBASSEMBLY SEE FIG. 21-50 FOR NHA								REF
	- 1 1N1116	.	.	SEMICONDUCTOR DEVICE	V03508	353-1611-00				1
	- 2 1N1116	.	.	SEMICONDUCTOR DEVICE	V03508	353-1611-00				1
		ATTACHING PARTS FOR 1 AND 2								

SECTION IV

POWER SUPPLY
SUBASSEMBLYILLUSTRATED PARTS
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FIG. & INDEX NO.	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
22	COML	.	WASHER	310-0059-00						2
			- - - -							
- 2A	757-3019-001	.	TERMINAL, LUG							2
- 3	IN2614	.	SEMICONDUCTOR DEVICE	V03508	353-1909-00					1
			A1CR3							
- 4	IN458	.	SEMICONDUCTOR DEVICE	V03508	353-0205-00					1
			A1CR20							
- 5	IN458	.	SEMICONDUCTOR DEVICE	V03508	353-0205-00					1
			A1CR19							
- 6	RN60C1212F	.	RESISTOR, 12,100 OHMS 1%, 1/8 W	V75042						1
			705-6299-00 A1R12							
- 7	RN60C3161F	.	RESISTOR, 3160 OHMS 1%, 1/8 W	V75042						1
			705-6285-00 A1R13							
- 8	RN60C3162F	.	RESISTOR, 31,600 OHMS 1%, 1/8 W	V75042						1
			705-6309-00 A1R14							
- 9	1N458	.	SEMICONDUCTOR DEVICE	V03508	353-0205-00					1
			A1CR18							
- 10	1N458	.	SEMICONDUCTOR DEVICE	V03508	353-0205-00					1
			A1CR17							
- 11	CL21CH4R5TP3	.	CAPACITOR, 4.5 UF +50-15%, 30 VDCW	V56289						1
			184-7276-00 A1C5							
- 12	RN65C5623F	.	RESISTOR, 562,000 OHMS 1%, 1/4 W	V75042						1
			705-4677-00 A1R15							
- 13	RN60C2152F	.	RESISTOR, 21,500 OHMS 1%, 1/8 W	V75042						1
			705-6305-00 A1R16							
- 14	RN60C6190F	.	RESISTOR, 619 OHMS 1%, 1/8 W	V75042						1
			705-6268-00 A1R3							
- 15	RN60C3831F	.	RESISTOR, 3830 OHMS 1%, 1/8 W	V75042						1
			705-6287-00 A1R6							
- 16	RN60C1211F	.	RESISTOR, 1210 OHMS 1%, 1/8 W	V75042						1
			705-6275-00 A1R2							
- 17	1N753A	.	SEMICONDUCTOR DEVICE, ZENER DIO, 6.2 V 5%							1
			V03508 353-2714-00 A1CR7							
- 18	CL31CH1R5MP3	.	CAPACITOR, 1.5 UF +50-15%, 30 VDCW	V56289						1
			184-7326-00 A1C2							
- 19	RN60C1781F	.	RESISTOR, 1780 OHMS 1%, 1/8 W	V75042						1
			705-6279-00 A1R5							
- 20	RN60C2671F	.	RESISTOR, 2670 OHMS 1%, 1/8 W	V75042						1
			705-6358-00 A1R8							
- 21	RN60C1781F	.	RESISTOR, 1780 OHMS 1%, 1/8 W	V75042						1
			705-6279-00 A1R7							
- 22	1N754A	.	SEMICONDUCTOR DEVICE, ZENER DIO, 6.8 V 5%							1
			V03508 353-2716-00 A1CR8							

SECTION IV

POWER SUPPLY
SUBASSEMBLYILLUSTRATED PARTS
CATALOG

FIG. & INDEX NO.	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
22 - 23	RN60C1781F	.	RESISTOR, 1780 OHMS 1%, 1/8 W	V75042						1
			705-6279-00 A1R10							
- 24	RN60C2151F	.	RESISTOR, 2150 OHMS 1%, 1/8 W	V75042						1
			705-6281-00 A1R1							
- 25	224L1-102	.	RESISTOR, VAR, 1000 OHMS 5%, 1/2 W	V80294						1
			381-1285-00 A1R4							
- 26	224L1-102	.	RESISTOR, VAP, 1000 OHMS 5%, 1/2 W	V80294						1
			381-1285-00 A1R9							
- 27	224L1-203	.	RESISTOR, VAR, 20,000 OHMS 5%, 1/2 W							1
			V80294 381-1289-00 A1R17							
			ATTACHING PARTS FOR 25 THRU 27							
	68-1660-26	.	NUT, SELF-LKG, HFX.	V72962	333-0604-00					2
	COML	.	WASHER 310-6320-00							2
	COML	.	SCREW 343-0130-00							2
			- - * - -							
- 28	2N1711	.	TRANSISTOR V96214	352-0400-00	A1Q9					1
- 29	2N657A	.	TRANSISTOR V96214	352-0354-00	A1Q6					1
- 30	2N657A	.	TRANSISTOR V96214	352-0354-00	A1Q7					1
- 31	2N697	.	TRANSISTOR V96214	352-0197-00	A1Q2					1
- 32	2N697	.	TRANSISTOR V96214	352-0197-00	A1Q3					1
- 33	2N1711	.	TRANSISTOR V96214	352-0400-00	A1Q8					1
- 34	1N2610	.	SEMICONDUCTOR DEVICE V03508	353-1905-00						1
			A1CR1							
- 35	541-5178-002	.	BUTTON, CABLE							1
- 36	541-5983-002	.	SPACER, SLV							1
			ATTACHING PARTS FOR 35 AND 36							
	MS35216-17	.	SCREW V77250	343-0138-00						1
			- - * - -							
- 37	1N2974RB	.	SEMICONDUCTOR DEVICE, ZENER D10, 10 V 5%							1
			V03508 353-1466-00 A1CR13							
- 38	1N2610	.	SEMICONDUCTOR DEVICE V03508	353-1905-00						1
			A1CR2							
- 39	CL23CJ1R5TN3	.	CAPACITOR, 1.5 UF ±50-15%, 50 VDCW	V56289						1
			184-7316-00 A1C13							
- 40	109D505C2050	.	CAPACITOR, 5 UF ±20-15%, 50 VDCW	V56289						1
	C2		184-7792-00 A1C8							
- 41	1N2610	.	SEMICONDUCTOR DEVICE V03508	353-1905-00						1
			A1CR11							
- 42	1N645	.	SEMICONDUCTOR DEVICE V03508	353-2607-00						1
			A1CR16							
- 43	1N2610	.	SEMICONDUCTOR DEVICE V03508	353-1905-00						1
			A1CR10							
- 44	1N2610	.	SEMICONDUCTOR DEVICE V03508	353-1905-00						1
			A1CR9							
- 45	1N2610	.	SEMICONDUCTOR DEVICE V03508	353-1905-00						1
			A1CR12							
- 46	1N2614	.	SEMICONDUCTOR DEVICE V03508	353-1909-00						1
			A1CR4							
- 47	554-2072-004	.	TERMINAL BOARD							1
- 48	A7575	.	RETAINER, TSTR SOC	V91662	352-9904-00					6
- 49	05-3307-51	.	SOCKET, TSTR	V91662	352-9903-00					6
- 50	SL286-301D	.	TERMINAL, FEEDTHRU	V12615	306-1331-00					26
	WHT									
- 51	SL275-197D	.	TERMINAL, FEEDTHRU	V12615	306-1521-00					27
	WHT									
- 52			DELETED							
- 53	SL295-315	.	TERMINAL, STANDOFF	V12615	306-1264-00					17
- 54			DELETED							
- 55			DELETED							
- 56	554-2071-004	.	TERMINAL BOARD							1



ILLUSTRATED PARTS CATALOG

SECTION IV DISTANCE MECHANISM

FIG. & INDEX NO.	PART NO.	NOMENCLATURE						USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6		
23	-	528-0470-005	DISTANCE MECHANISM	A8	SEE FIG. 1-7			L,N	REF
			FOR NHA						
23	-	528-0470-006	DISTANCE MECHANISM	A8	SEE FIG. 1-7			M	REF
			FOR NHA						
	- 1	MS35216-44	• SCREW	V77250	343-0191-00				4
			ATTACHING PARTS						
	- 2	340-0642-00	• SLEEVE, SPG						4
	- 3	4708-06-02-4 102	• WASHER	V78189	373-0157-00				4
			- - * - -						
	- 4	761-7852-001	• COVER ASSY, DISTANCE MECHANISM						1
			ATTACHING PARTS						
	- 5	MS35200-3	• SCREW	V77250	342-0133-0Q				4
			- - * - -						
	- 6	F22NCFMA1-26	• NUT, SELF-LKG, CLINCH	V72962					2
			333-0837-00						
	- 7	761-3509-001	• COVER						1
	- 8	761-7853-001	• GEAR HOUSING ASSY						1
			ATTACHING PARTS						
	- 9	MS35200-3	• SCREW	V77250	342-0133-00				2
	- 10	MS35216-13	• SCREW	V77250	343-0134-00				4
	- 11	347-0009-00	• SCREW	347-0009-00	EFF THRU MCN 257				2
	- 11	347-0010-00	• SCREW	347-0010-00	EFF MCN 258				2
	- 12	MS35338-78	• WASHER	V79807	310-0279-00				6
			- - * - -						
	- 13	761-3508-001	• BEZEL, DIAL						1
	- 14	541-6559-002	• PIN, LOCATING						2
	- 15	F22NCFMA2-26	• NUT, SELF-LKG, CLINCH	V72962					2
			333-0838-00						
	- 16	554-2820-001	• HOUSING, GEAR						1
	- 17	761-7855-001	• CONNECTOR, PRSD						1
	- 18	F22NCFMA1-26	• NUT, SELF-LKG, CLINCH	V72962					2
			333-0837-00						
	- 19	DD50PC7	• CONNECTOR, RECP	V71468	371-0118-0				1
			A8P1						
	- 20	761-3529-001	• DISK, STEPPED						1
	- 21	761-3535-001	• DIAL, SCALE						1
			ATTACHING PARTS FOR 20 AND 21						
	- 22	323-0254-00	• SCREW	323-0254-00					2
	- 23	310-0501-00	• WASHER	310-0501-00					2
			- - * - -						
	- 24	761-3507-001	• DIAL, SCALE						1
			ATTACHING PARTS						
	- 25	323-0254-00	• SCREW	323-0254-00					2
	- 26	310-0501-00	• WASHER	310-0501-00					2
			- - * - -						
	- 27	761-3503-001	• CONNECTING LINK, RIGID						1
			ATTACHING PARTS						
	- 28	MS16633-1006	• RING, RETAINING	V89462	340-0098-00				2
			- - * - -						
	- 29	761-7854-001	• CONNECTING LINK, RIGID						1
			ATTACHING PARTS						
	- 30	324-0056-00	• SCREW, CAP, SCH		EFF THRU MCN 257				1
	- 30	324-1673-010	• SCREW, CAP, SCH		EFF MCN 258				1
	- 31	761-3536-001	• PLATE, GEAR						1
			ATTACHING PARTS						
	- 32	MS35216-3	• SCREW	V77250	343-0124-00				3
	- 33	MS35338-77	• WASHER	V79807	310-0275-00				3
			- - * - -						

SECTION IV

DISTANCE MECHANISM

ILLUSTRATED PARTS
CATALOG

FIG. & INDEX NO.	PART NO.	NOMENCLATURE							USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7		
22 - 34	761-3499-001	. POST, ELECTRICAL-MECHANICAL EQUIP.								2
		ATTACHING PARTS								
- 35	MS35216-3	. SCREW V77250 343-0124-00								2
- 36	MS35338-77	. WASHER V79807 310-0275-00								2
		- - * - -								
- 37	SS3332FCEP25 LY5	. BEARING, BALL, ANNULAR V40920 309-1037-00								4
- 38	761-3512-003	. GEARSHAFT, SPUR, 18 AND 61 TEETH								1
- 39	761-3511-003	. GEARSHAFT, SPUR, 19 AND 78 TEETH								1
- 40	SS3332FCEP25 LY5	. BEARING, BALL, ANNULAR V40920 309-1037-00								2
- 41	546-3791-002	. CLAMP, GEAR								1
		ATTACHING PARTS								
- 42	324-0056-00	. SCREW, CAP, SCH EFF THRU MCN 257								1
- 42	324-1673-010	. SCREW, CAP, SCH EFF MCN 258								1
- 43	761-3520-001	. GEARSHAFT, SPUR, 64 TEETH								1
- 44	761-3515-001	. GEARSHAFT, SPUR, 12 TEETH								1
- 45	SS3332FCEP25 LY5	. BEARING, BALL, ANNULAR V40920 309-1037-00								2
- 46	761-7857-001	. GEARSHAFT ASSY								1
- 47	761-3498-001	. . GEAR, SPUR, 90 TEETH								1
- 48	761-3513-001	. . DISK, LOCKING								1
- 49	761-3514-001	. . GEAR SECTOR, 30 TEETH								1
		ATTACHING PARTS FOR 47 THRU 49								
- 50	MS16562-189	. . PIN V72962 311-0416-00								1
		- - * - -								
- 51	761-3519-001	. . HUB, GEAR								1
- 52	546-3766-002	. GEAR, LOADING, 40 TEETH								1
		ATTACHING PARTS								
- 53	MS16632-1018	. RING, RETAINING V89462 340-0113-00								1
		- - * - -								
- 54	546-3801-002	. SPRING, LOAD								1
- 55	546-3765-002	. GEAR, MAIN RESOLVER, 40 TEETH								1
- 56	546-3790-002	. CLAMP, GEAR								1
		ATTACHING PARTS FOR 55 AND 56								
- 57	324-0056-00	. SCREW, CAP, SCH EFF THRU MCN 257								1
- 57	324-1673-010	. SCREW, CAP, SCH EFF MCN 258								1
- 58	761-3527-003	. GEAR CLUSTER, SPUR, 30 AND 40 TEETH								1
- 59	546-3790-002	. CLAMP, GEAR								1
		ATTACHING PARTS FOR 58 AND 59								
- 60	324-0056-00	. SCREW, CAP, SCH EFF THRU MCN 257								1
- 60	324-1673-010	. SCREW, CAP, SCH EFF MCN 258								1
- 61	761-3523-003	. GEAR CLUSTER, SPUR, 40 AND 60 TEETH								1
		ATTACHING PARTS								
- 62	MS16633-1009	. RING, RETAINING V89462 340-0086-00								1
		- - * - -								
- 63	761-3522-001	. PIN, STEPPED								1
		ATTACHING PARTS								
- 64	MS35216-2	. SCREW V77250 343-0123-00								1
- 65	MS35338-77	. WASHER V79807 310-0275-00								1
- 66	COML	. WASHER 310-0044-000								1
- 67	761-3521-003	. GEAR CLUSTER, SPUR, 20 AND 60 TEETH								1
		ATTACHING PARTS								
- 68	MS16632-1012	. RING, RETAINING V89462 340-0112-00								1
		- - * - -								



ILLUSTRATED PARTS CATALOG

SECTION IV
DISTANCE MECHANISM

FIG. & INDEX NO.	PART NO.	NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
		1 2 3 4 5 6 7		
23	- 69	761-3500-001 . POST, ELECTRICAL-MECHANICAL EQUIP.		1
		ATTACHING PARTS		
	- 70	MS35216-2 . SCREW V77250 343-0123-00		1
	- 71	MS35338-77 . WASHER V79807 310-0275-00		1
	- 72	COML . WASHER 310-0044-000		1
		- - * - -		
	- 73	761-3526-001 . GEAR, SPUR, 100 TEETH		1
	- 74	546-3801-002 . SPRING, LOAD		1
	- 75	761-3532-001 . GEAR, SPUR, 100 TEETH		1
	- 76	546-3790-002 . CLAMP, GEAR		1
		ATTACHING PARTS FOR 73 THRU 76		
	- 77	324-0056-00 . SCREW, CAP, SCH EFF THRU MCN 257		1
	- 77	324-1673-010 . SCREW, CAP, SCH EFF MCN 258		1
	- 78	MS16632-1025 . RING, RETAINING V89462 340-0114-00		1
		- - * - -		
	- 79	761-7856-001 . GEARSHAFT ASSY, 48 TEETH		1
		ATTACHING PARTS		
	- 80	MS16633-1009 . RING, RETAINING V89462 340-0086-00		1
		- - * - -		
	- 81	SS3332FCEP25 . BEARING, BALL, ANNULAR V40920		2
		LY5 309-1037-00		
	- 82	761-3530-003 . GEAR, COMPOSITE, 12 AND 64 TEETH		1
		ATTACHING PARTS		
	- 83	MS16632-1012 . RING, RETAINING V89462 340-0112-00		1
		- - * - -		
	- 84	761-3500-001 . POST, ELECTRICAL-MECHANICAL EQUIP.		1
		ATTACHING PARTS		
	- 85	MS35216-2 . SCREW V77250 343-0123-00		1
	- 86	MS35338-77 . WASHER V79807 310-0275-00		1
	- 87	COML . WASHER 310-0044-000		1
		- - * - -		
	- 88	546-3790-002 . CLAMP, GEAR		1
	- 89	761-7858-001 . GEAR, SPUR		1
		ATTACHING PARTS FOR 88 AND 89		
	- 90	324-0056-00 . SCREW, CAP, SCH EFF THRU MCN 257		1
	- 90	324-1673-010 . SCREW, CAP, SCH EFF MCN 258		1
	- 91	761-3513-001 . . DISK, LOCKING		1
		ATTACHING PARTS		
	- 92	MS16562-190 . . PIN V72962 311-0417-00		1
		- - * - -		
	- 93	761-3516-001 . . GEAR, SPUR, 30 TEETH		1
	- 94	761-3532-002 . GEAR, SPUR, 100 TEETH		1
		ATTACHING PARTS		
	- 95	MS16632-1025 . RING, RETAINING V89462 340-0114-00		1
		- - * - -		
	- 96	756-9769-001 . SPRING, ARC		1
	- 97	761-3524-001 . GEAR, SPUR, 100 TEETH		1
	- 98	546-3790-002 . CLAMP, GEAR		1
		ATTACHING PARTS FOR 97 AND 98		
	- 99	324-0056-00 . SCREW, CAP, SCH EFF THRU MCN 257		1
	- 99	324-1673-010 . SCREW, CAP, SCH EFF MCN 258		1
	-100	761-3525-001 . GEAR, SPUR, 25 TEETH		1
		ATTACHING PARTS		
	-101	MS16632-1012 . RING, RETAINING V89462 340-0112-00		1
		- - * - -		
	-102	761-3500-001 . POST, ELECTRICAL-MECHANICAL EQUIP.		1



FIG. & INDEX NO.	PART NO.	NOMENCLATURE					USAGE CODE	UNITS PER ASSY.	
		1	2	3	4	5	6	7	
23		ATTACHING PARTS							
-103	MS35216-2	•	SCREW	V77250	343-0123-00				1
-104	MS35338-77	•	WASHER	V79807	310-0275-00				1
-105	COML	•	WASHER	310-0044-000					1
		-	-	*	-	-	-		
-106	CG10LCJS03A9 15	•	SYNCHRO, XMTR	V86197	229-3043-010	A8B4			1
-107	546-3794-002	•	CLAMP, MOTOR						3
			ATTACHING PARTS FOR 106 AND 107						
-108	MS35216-4	•	SCREW	V77250	343-0125-00				3
-109	MS35338-77	•	WASHER	V79807	310-0275-00				3
		-	-	*	-	-			
-110	CS402-2-54	•	SWITCH, ROT., 2 SECT.	V08127				L,N	1
				259-9479-020	A8S1				
-110	CS402-3-54	•	SWITCH, ROT., 3 SECT.	V08127				M	1
				259-9479-010	A8S1				
-111	761-3505-001	•	BUSHING, SLV						3
			ATTACHING PARTS FOR 110 AND 111						
-112	MS35216-3	•	SCREW	V77250	343-0124-00				3
-113	MS35338-77	•	WASHER	V79807	310-0275-00				3
		-	-	*	-	-			
-114	PS11CZ	•	RESISTOR, VAR, SECT. 1, 20,000 OHMS 1%, 0.75 W, SECT. 2 AND 3, 2000 OHMS 1%, 0.46 W	V91637	381-1729-010	A8R1			1
-115	546-3799-002	•	CLAMP, POTENTIOMETER						3
			ATTACHING PARTS						
-116	MS35216-3	•	SCREW	V77250	343-0124-00				3
-117	MS35338-77	•	WASHER	V79807	310-0275-00				3
		-	-	*	-	-			
-118	RN65D2150F	•	RESISTOR, 215 OHMS 1%, 1/4 W	V75042					1
				705-7064-00	A8R2				
-119	761-3528-001	•	SLEEVE, STEPPED						1
			ATTACHING PARTS						
-120	MS35216-2	•	SCREW	V77250	343-0123-00				2
-121	MS35338-77	•	WASHER	V79807	310-0275-00				2
		-	-	*	-	-			
-122	CG10LCJS03A9 15	•	SYNCHRO, XMTR	V86197	229-3043-010	A8B3			1
-123	546-3794-002	•	CLAMP, MOTOR						3
			ATTACHING PARTS FOR 122 AND 123						
-124	MS35216-4	•	SCREW	V77250	343-0125-00				3
-125	MS35338-77	•	WASHER	V79807	310-0275-00				3
-125A	COML	•	WASHER	310-6320-00					3
		-	-	*	-	-			
-126	AFRH10KF328	•	MOTOR-TACHOMETER	V86197	229-2045-030				1
			A8MG1	EFF MCN 258	FOR DETAIL				
			BREAKDOWN SEE COLLINS PUBLICATION						
			523-0757895						
			OR						
-126	ST10087	•	MOTOR-TACHOMETER	V03998	229-2045-020				1
			A8MG1	FOR DETAIL BREAKDOWN SEE COLLINS					
			PUBLICATION 523-0757895						
-127	546-3794-002	•	CLAMP, MOTOR						3
			ATTACHING PARTS FOR 126 AND 127						
-128	MS35216-4	•	SCREW	V77250	343-0125-00				3
-129	MS35338-77	•	WASHER	V79807	310-0275-00				3
		-	-	*	-	-			
-130	554-7191-002	•	SHAFT, STRAIGHT						1
			ATTACHING PARTS						
-131	MS20365D440A	•	NUT, SELF-LKG, HEX.	V72962	333-0347				1
-132	310-0046-00	•	WASHER	310-0046-00					1
-133	MS16633-1012	•	RING, RETAINING	V89462	340-0087-00				1
		-	-	*	-	-			



ILLUSTRATED PARTS CATALOG

SECTION IV
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FIG. & INDEX NO.	PART NO.	NOMENCLATURE										USAGE CODE	UNITS PER ASSY.
		1	2	3	4	5	6	7					
R 23	-134	S518FCHHEP25 LY5	.	BEARING, BALL, ANNULAR	V40920								2
			.	309-1062-00									
R	-135	761-3531-001	.	BODY, DUMMY RESISTOR	A8R3								1
R	-136	546-3795-002	.	CLAMP, RESOLVER									2
			.	ATTACHING PARTS FOR 135 AND 136									
R	-137	MS35216-3	.	SCREW	V77250	343-0124-00							2
R	-138	MS35338-77	.	WASHER	V79807	310-0275-00							2
			.	- - * - -									
R	-139	CG10LCJS03A9 15	.	SYNCHRO, XMTR	V86197	229-3043-010	A8B2						1
R	-140	CSH10RCLS6A9 48	.	SYNCHRO, RESOLVER	V86197	229-0246-010							1
R	-141	546-3794-002	.	CLAMP, MOTOR									6
			.	ATTACHING PARTS FOR 139 THRU 141									
R	-142	MS35216-4	.	SCREW	V77250	343-0125-00							6
R	-143	MS35338-77	.	WASHER	V79807	310-0275-00							6
			.	- - * - -									
R	-144	761-3497-001	.	NUT, PLAIN									1
			.	ATTACHING PARTS									
R	-145	MS35200-3	.	SCREW	V77250	342-0133-00							1
			.	- - * - -									
R	-146	AB397-2	.	TERMINAL, STUD	V12615	306-1287-00							1
			.	ATTACHING PARTS									
R	-147	310-0044-00	.	WASHER	310-0074-00								1
			.	- - * - -									
R	-148	2522-33	.	TERMINAL, STUD	V88245	306-0237-00							5
			.	ATTACHING PARTS									
R	-149	MS35338-77	.	WASHER	V79807	310-0275-00							5
R	-150	310-6320-00	.	WASHER	310-6320-00								1
			.	- - * - -									
R	-151	761-3538-001	.	PLATE, GEAR									1
R	-152	763-6078-001	.	NUT, CAPTIVE									2